Issues and Alternatives

Policies for Ontario's Energy

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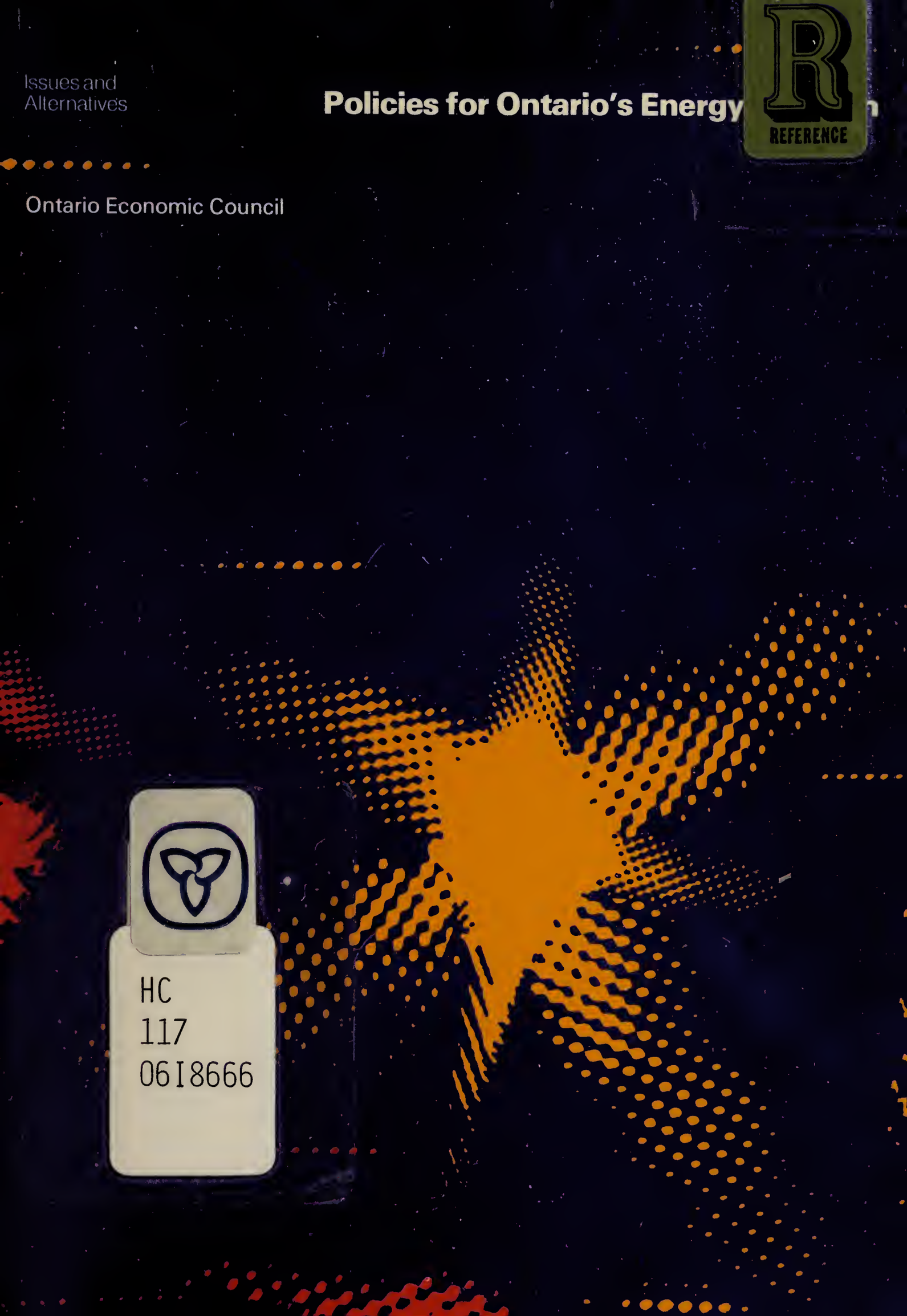

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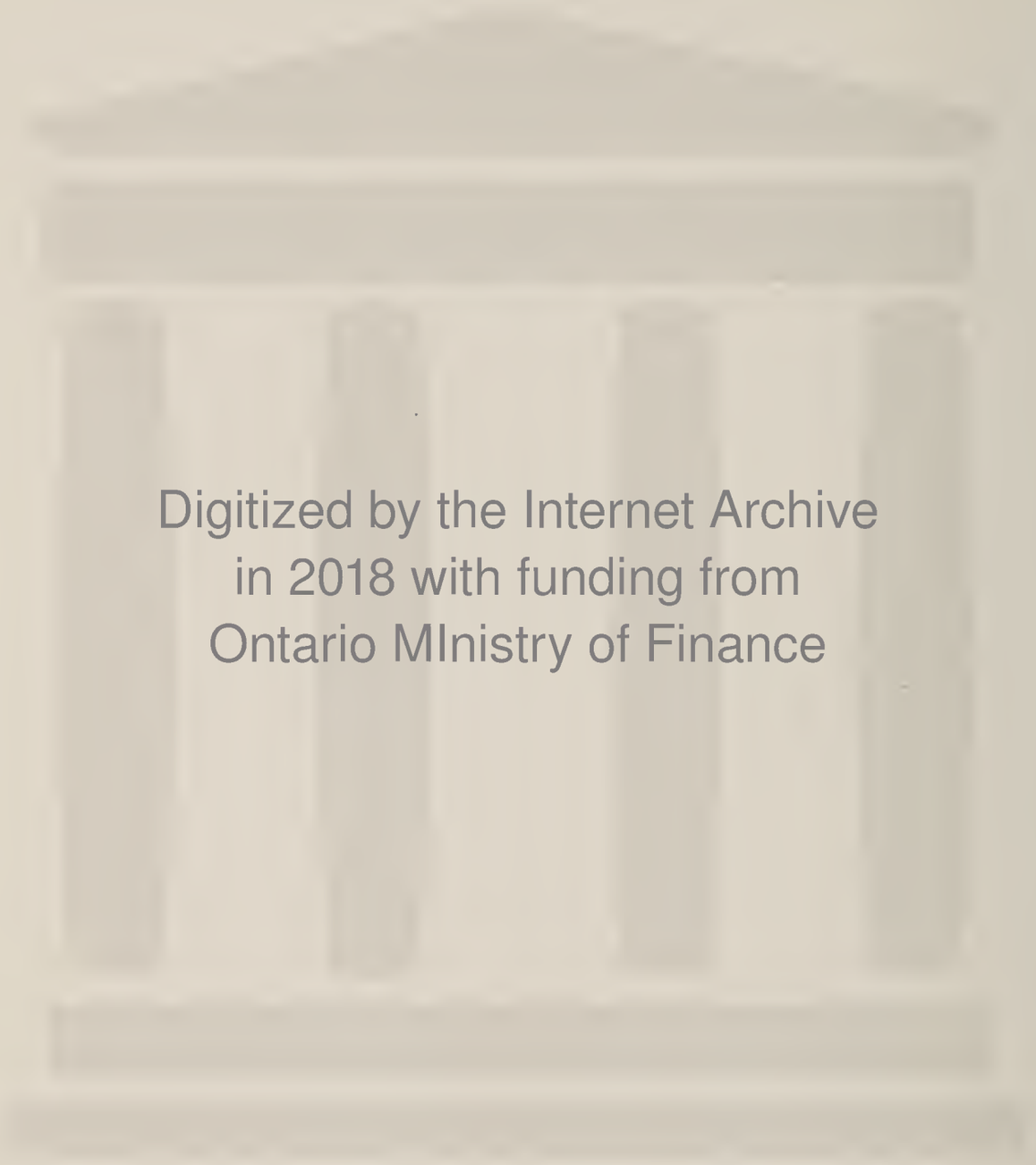

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ISSUES AND ALTERNATIVES

Policies for Ontario's Energy Problem

Ontario Economic Council

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Executive summary and recommendations

THE PROBLEM

The essence of Canada's energy crisis may be described in the following propositions:

° The supply of oil for Canada has been falling, and it will almost certainly continue to fall.

° The demand for oil in Canada has been rising rapidly since the 1920s, and it very probably will continue to do so. Moreover, the demand for petroleum is unusual in this way: when its price is raised, the amount purchased declines, but not as rapidly. For instance, if the price were to rise by 10 per cent, the amount purchased would fall by no more than 3 or 4 per cent in the short run, assuming no changes in the other determining factors.

° Canada's reserves of petroleum and natural gas are located far from its major consuming centres: Alberta holds the largest share, with British Columbia, Saskatchewan, the Arctic regions, and the ocean bed off Newfoundland holding almost all the rest. Under the terms of the BNA Act (section 109) 'All Lands, Mines, Minerals and Royalties belonging to the several Provinces ... and all sums payable for such Land, Mines, Minerals, or Royalties shall belong to the Provinces.' But the federal government, as the Act has been interpreted, has jurisdiction 'over interprovincial and international trade' and can 'levy indirect taxes.' In response to that, and confusing the matter still further, a producing province might counter any unilateral decision of the federal government to impose such a tax by restricting the output from wells within its borders. The issue of jurisdiction, including the right to levy taxes, is thus complex.

GENERAL ANALYSIS

With demand rising and supply falling the amounts buyers would want to purchase at the initial price will exceed, by an ever-widening margin, the amounts that sellers (including foreign sources) would make available at

that price*. In a free and competitive market the price of petroleum would rise, as would the costs and ultimately too the price of each item that required for its production a significant amount of petroleum (directly or indirectly).

Although the world's oil supply has in a sense been falling from the day the first barrel was taken from the non-renewable reserves under the earth's crust, the decline was obscured for decades by a succession of major oil discoveries and a continuing stream of technological breakthroughs, which by lowering costs led temporarily to an offsetting increase in the supply. Moreover, during much of the period 1922-72 the oil refineries, through their immense market power, were able to purchase crude petroleum at a nearly constant price; indeed in real terms the price fell. As a result the price of finished petroleum products - gasoline for cars, heating oil for houses, and office buildings, and fuel oil for industrial processing - remained almost constant in dollars; in real terms it actually declined, except in those few countries that had imposed a steadily rising tax on gasoline.

The bewildered consumer who read in his newspaper that the world was running out of petroleum would be reassured next morning when he stopped by the gas pump and noted that the price was the same as he had been paying for several years. When prices acted so as to contradict the experts, almost everyone believed the former.

Unfortunately, the experts were right and the market was wrong. Oil prices are now at least ten times what they were in 1972. But in the United States and especially in Canada the price to the final buyer has been kept from rising so rapidly.

The continued fall until recently in the real price of petroleum has had unfortunate side-effects upon the economy. It has relieved many

* The two terms 'demand' and 'supply' are used here and elsewhere in this report in the technical sense they have in economic analysis. An increase in 'demand' means that the amount (in physical units, such as tons or barrels) that buyers would purchase at any price, such as that of the base period, is now higher than it was then. A fall in 'supply' means that the amount (again measured in physical units) that sellers would now make available at any price, such as that in the base period, is lower than it was then. Hence, the 'supply' of Saudi Arabian Light Crude to Canada fell between 1972 and 1980, because at the price of about $2.50 a barrel the sellers made 18 million barrels available in 1972; but at the same price ($2.50 a barrel) in 1980 they would supply none at all.

pressures that in a different environment would have encouraged the necessary adjustments. The automobiles on Canada's roads are still relatively inefficient users of gasoline; houses are large and poorly insulated and often overheated in winter. As a result Canada uses more petroleum per person than any other country, and the United States is close behind. Admittedly, cold winters and long distances account for some of this excess, but the low domestic price has surely been important too.

Even now despite the growing scarcity of oil, Canada continues to use it wastefully and recklessly.

IS CANADA A SPECIAL CASE?

It is tempting to argue that since Canada is now known to possess much larger reserves than were known thirty years ago, there is a strong case for continuing to treat petroleum as a decidedly abundant resource and use it as though it could never become scarce. But that argument overlooks three factors:

- Today any petroleum brought to the world market can be sold for $30 a barrel or more; in 1950 the price was no higher than $2.50. Whether the price charged in Canada is $30 or $5 is really irrelevant to any judgment as to its real scarcity, because every barrel used in Canada actually costs the economy the $30 that it could have been sold for if exported to the United States or elsewhere.
- Today, the costs of bringing Canada's reserves to market are much higher than they were thirty years ago because wells must go deeper and often must be drilled under turbulent seas or through the permafrost.
- Today, as exploration has had to be extended into more remote and difficult areas, producers recognize that commercial reserves are finite, and that further additions to what they will be able to exploit are likely to be few in number. In 1950 it was easier, though scarcely rational, to believe that supplies were limitless. But owners of any known reserves are becoming increasingly reluctant to sell any at the going price because they know that by leaving it untapped for a few years they will be able to sell it for far more when they do make it available.

Growing scarcity on a world scale means that with no change in

price or no 'artificial' restraints on demand, actual shortages will be felt everywhere. If at the price of $15 a barrel buyers would seek to purchase 100 units, sellers would be willing to make available fewer units, say only 40. Accordingly, the average buyer could get no more than two gallons for every five he wanted at $15. And if anyone did succeed in purchasing more than his 'quota' of 40 per cent of the amount he sought to buy, others would find that they had to be content with less than 40 per cent.

POSSIBLE POLICY STRATEGIES

There are any number of ways of dealing with such a shortage:

- The price could be allowed to rise. As it rose, it would ease the shortage in two ways. First, users would be encouraged to reduce purchases, each presumably cutting down on activities to which he had assigned a low priority while maintaining others judged more important. Secondly, the increased price would encourage suppliers to raise their output. If the price rose far enough, the shortage would end.
- The price could be pushed up by levying a tax of so many cents a gallon. While such a procedure would discourage waste by users, taken by itself it would not encourage producers to make more gasoline available. In fact they might decide to produce less.
- Increases in output could be encouraged by the grant of a subsidy of a specified amount per unit of output.
- Consumption could be reduced by rationing the purchaser. The amount of the reduction in use could be altered by a change in the average ration.
- The price could be held at the original level, and buyers could be left to battle for the scarce supply.
- The amount available within the country could possibly be increased by outbidding other countries for imports. But while any one country could gain at the expense of the others, obviously all importers could not gain simultaneously, unless the exporting countries could be persuaded to raise their production.
- A country like Canada possessing a surplus of one form of energy, such as natural gas, could impose an embargo or a tax on exports of that

item to ensure that the supply of energy available for its own use was increased. But of course one country's gain is secured at the expense of others; all importers cannot gain together.

- The price for crude from domestic sources could be permitted to rise part way to the level at which the fall in the amount demanded and the rise in the amount supplied ended the shortage. But then a partial shortage would remain if the price were kept from rising by the full amount. This could be eased by adopting such measures as a subsidy on production or an export tax on natural gas. This is a crude description of Canada's current policy. Because the price to domestic users is held at approximately $15.30 a barrel (or its equivalent for a gallon of gasoline), whereas the price that would make the amounts demanded and supplied equal is about $30, a different and higher price must be paid to domestic processors - in the form of a subsidy to encourage them to produce enough of the final products to satisfy the expanded market. One effect of this potpourri of measures is to raise Canada's imports.

THE PROBLEM OF SIDE-EFFECTS

If energy were of very little importance to the economy the choice of policy could be simply a question of adopting the most effective way of dealing with any such shortage. But energy is enormously important to the economy. It is a vital input to most productive processes; it is a very large item in the budget of consumers, who are loath to surrender more than a small fraction of it in response to an increase in its price. Because reserves are distributed unevenly across the earth's surface and usually lie far from centres of consumption, the international trade in energy is very heavy; at today's prices the value of the trade in petroleum is a large fraction of total trade.

Whatever is done to ease the problem of energy scarcity is therefore bound to have very substantial side-effects. Some of the ways of dealing with such a shortage will sharply affect the inflation rate; some of them will influence the level of economic activity, possibly enough to turn prosperity into depression; some policies will reduce the economy's capacity to produce just as though a plague had eliminated a signficant fraction of the skilled labour force; some of them will transfer large amounts of income from one class to another, and from one region or

country to another, not always fairly; some of them will entail an increase in government intervention, which might even run so strongly counter to market forces as to induce evasion of regulations and rules.

ECONOMIC GOALS

This is only a partial list, but it shows why an energy program can be chosen only in light of the whole range of economic goals. Those goals are as follows:

- easing the specific shortage of energy,
- responding to the public's notions of the fair distribution of income among classes and regions,
- maintaining activity in the economy at a high enough level,
- preventing the rate of inflation from going too high,
- preventing unnecessary declines in the economy's capacity to produce, and
- adopting a policy of domestic production that seeks to avoid an unduly high dependence on foreign sources of supply but at the same time does not drain domestic reserves so rapidly that energy affluence for the present is purchased at the cost of starvation afterwards.

Other non-economic goals are no less important.

RECOMMENDATIONS

With so many goals it is quite unreasonable to expect that a specific policy measure - such as allowing the market mechanism to ease the shortage - can achieve a satisfactory approach to them all. A suitable program is very likely to be composed of a mix of policies: higher prices for domestic supplies combined with taxes on the use of energy, subsidies on goods that use comparatively little energy, economic measures to counter any tendency to drive the economy into recession, other measures to counter inflationary pressures, and so on.

Unnecessary increases in the uncertainty to which the private decision-maker is exposed are likely to weaken the response mechanism of the private sector. Thus there are strong reasons, once a program has

been formulated, to announce it publicly and to make it as binding as can be.

Moreover, even where the formal responsibility is lodged in only one level of government, it is very important to get as much co-ordination of federal and provincial activities as possible.

The specific policies on energy that the Council endorses are as follows:

1 To achieve greater efficiency in the use of petroleum an increase in its price must be allowed (or forced by taxes). Generally, prices should be raised to the Chicago benchmark price or to the world price, although a case can be made for proceeding with all deliberate speed rather than abruptly. Prices at all levels - crude, refined products, at the gas pump, and from the delivery truck - would then rise.

The importance of increasing the price to users to realistic levels is vital. Only by appropriate pricing can effective conservation be achieved. Subsidies to keep oil prices low, entailing balance of payments deficits, are not viable in the long run. Rationing, although a useful measure for a temporary emergency is a cumbersome, costly, and inefficient policy if adopted as a permanent solution. Shortages, queues, and depression are clearly far from optimal. A nation that responds to an oil shortage by subsidizing gasoline consumption while continuing to tax bicycles and shoes and that subsidizes oil for heating while taxing blankets and warm clothing is clearly giving consumers strong encouragement to waste oil when they should instead be encouraged to conserve it and use it efficiently.

With a view to reducing Canada's dependence upon unstable sources of supply, either a special price advantage or a system of subsidies should perhaps be established in favour of firms that extract crude petroleum from tar sands or from especially difficult undersea wells. These price advantages and the costs of the subsidies need not be covered by prices at retail since the whole of society would gain from some insurance against stoppages, and general taxes could legitimately be used to cover such extra costs.

In determining how much of the proceeds from higher prices should go to the federal government (through federal taxes) and how much should be taken by the provincial governments (Alberta and other pro-

ducing provinces) and the producing corporations, attention would have to be paid to considerations of equity (by income class and by region), supply, the maintenance of prosperity, the relative claims of the future and the present, and any problems of administration that would arise.

Furthermore, taxes are now determined at several levels of government and rarely co-ordinated. An increase in taxes would be advisable but only after measures for effective co-ordination have been implemented. Secondly, there are serious tax loopholes in the energy sector that should be closed. And third, profits in the energy sector are likely to continue their rapid rise. If, as is often claimed, a large share of these increases leaves this country, modifications in the basic tax on energy sector profits may be desirable.

Political issues will affect the purely economic factors listed here. Though there is no reason to believe that a formula once worked out would be appropriate at all future times, changes should be made rarely and only some time after adequate public notice. Uncertainties in the energy sector will surely be great enough to interfere with efficiency in the firm's planning without aggravating them through government policies that change frequently.

2 To promote the domestic output of energy over a period of years, it will be necessary to pay in some way for exploration, the development of new fields, and additional pipelines. A mix of higher prices to producers and government contracts for specific projects seems appropriate. The importance to be assigned to these two incentives should be determined after analysing the structure of each part of the oil industry, patterns of ownership including residence, the experience with these alternatives, and the problems that each creates with respect to equity, maintaining prosperity, and the other objectives of policy.

3 The necessary substantial increases in oil prices, whether achieved by market pricing or taxation, will make consumers worse off than they otherwise could be, but the alternatives are worse still. However, such increases will make apparent the fact that the oil crisis must inevitably reduce our standard of living. To the extent that the price is increased because of higher taxes on gasoline and other oil products, the resulting increases in revenues will allow reductions of sales and excise taxes on other goods, thereby offsetting, at least partially, the impact on the cost of living. Our indexed personal income tax system automatically provides

some cushions for families subject to this tax, but further relief to those hardest hit - for example to those whose income is so low that they pay little or no income tax - may still be necessary. How extensive such additional relief should be is a question for political judgment, but it will be better achieved by transfers of income than by the continued inefficient subsidy to keep oil prices down.

4 The differences in the effects of increased oil prices on different regions of the country will be partly offset by existing systems of taxation and equalization payments, but as these now stand they may well be judged inadequate. The challenge to politicians is to devise an equitable and efficient system of income transfers to replace the inefficient policy of subsidizing oil to keep its price low.

5 Arrangements for imposing rationing should be made well in advance and kept current. However, rationing should be used only for such emergencies as a blocking of imports (or an embargo upon exports of petroleum by OPEC) or interruptions to the flow of Canadian-produced petroleum to regions that normally receive it.

6 The impact of OPEC's price rises will be deflationary for income and inflationary for prices. Measures adopted in Canada to share the burden more fairly may accentuate these problems. A co-ordinated policy to ease this problem of 'stagflation' should be adopted, including measures not only to maintain demand but also measures to raise the aggregate supply function for the Canadian economy. This proposal is critically important, because unless the Canadian economy is kept prosperous some of the other recommendations will be very difficult to implement. However, if the economy can be stabilized at a prosperous level and price rises can be slowed, we believe that our proposals will be acceptable and effective.

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PREFACE

The Act to establish the Ontario Economic Council sets down that it is the duty of the Council 'to advise and make recommendations for encouraging the maximum development of the human and material resources of Ontario' and for 'fostering conditions for the realization of higher standards of living for the people of Ontario.' The Council may 'conduct socioeconomic studies in any area it considers to be of concern ... publish such studies and create an awareness and public understanding of provincial socio-economic issues by holding seminars and conferences.'

Since the problems the Council must consider are usually technical in nature, they must be dealt with by professional economists; since the analysis, if it is to enlighten the public, must also be understandable to the intelligent outsider, the results must be written up from the technical language that economists use when communicating among themselves into plain English, or a reasonable approximation of it.

There can be no doubt as to the importance for Ontario of the energy problem and the policies proposed for dealing with it. Serious adjustments will be required of individuals, families, and firms large and small - and required whether we elect to cope or not. The increasing scarcity of energy will not go away. If we, the province, the whole country, and even all the energy-consuming areas of the world, fail to deal with it properly, we face cars that won't run, stilled factories, dark and cold homes, a raging inflation, persistent and heavy unemployment, and even the threat of open conflict between classes, regions, and countries. But if we can design and support suitable policies, we may manage to get away with nothing more than relatively minor nuisances - driving less and walking much more, living in a house cooler in winter and warmer in summer. Thus, provided we adopt suitable policies, we will have to get along with, say, 90 per cent of the real income we could otherwise have enjoyed, though with particular products perhaps priced out of the reach of most of us.

Clearly, the issues involved are of the greatest importance, and it is for this reason that the Ontario Economic Council believes that it must do what it can to inform the government and the residents of this province

about them. It is convinced that with problems so complex, solutions will be found not by relying upon simplistic slogans but through careful analysis.

Under the British North America Act, the settlement of many of these issues will see one province opposed to another and groups of provinces fighting off attempts at intervention by the federal government. The constitutional lawyer and the political scientist must contribute their insights to the solution of the problems with which Canada must deal. But an objective analysis of the economic issues involved should also play its part.

In preparing this position paper, we have drawn upon the analyses presented by participants at the Ontario Economic Council's Conference on Energy, 27-8 September 1979, and the discussions they engendered. We acknowledge, with gratitude, this source. In the interest of intelligibility, the analysis set out in this document has been simplified, but despite the occasional absence of qualifying comments and omission of details, we hope that it retains most of its technical respectability.

INTRODUCTION

The general problem: description

The essence of the energy problem that confronts the developed economies of Europe, North America, and Japan is the increasing scarcity of conventional energy supplies. That is no less true for Canada with its large reserves of natural gas and heavy oil than it is for such countries as Japan, Denmark, and Switzerland, which possess none or very little conventional energy in usable forms. Costs everywhere rise steadily as exploration for petroleum and natural gas must be moved to ever more remote regions, as heavy oil must be upgraded, as wells have to go deeper, as pipelines must be lengthened, and as concern for the quality of the environment requires more complicated and expensive anti-pollution measures.

For decades increasing scarcity has been a fact of life. But until 1973 it was simply ignored. Indeed, it was effectively obscured by the perverse behaviour of energy prices.

With increasing scarcity, the price of energy should have risen relative to other prices. In fact, the real price of energy, that is, the price corrected for inflation, fell almost without interruption from the 1920s to 1973. That paradoxical decline did not originate in the behaviour of competitive market forces. Bargaining over the price - if that term is not completely misleading - frequently involved only a single party, usually one of the petroleum giants, which acted as both buyer and seller. The decline had an additional source in the misguided policies of many governments, which set taxes on petroleum at a steadily declining real rate. Unfortunately, though the petroleum-consuming countries gained in the short run from this price fall (and the petroleum producers just as surely lost), their former gains compel consuming countries now to undertake costly adjustments.

Because energy prices were low and falling, users were encouraged to waste fuel. From the Tin Lizzie of the 1910s and 1920s to the gas guzzlers of today was admittedly a giant step in transportation, but judged in terms of fuel efficiency it was a giant step backwards. And yet it can

be explained. The real price of gasoline fell by about 34 per cent from 1924 to 1974, and even in 1979 it stood below its 1924 level; the real price of heating oil, at least in North America, behaved in much the same way. Consequently coal furnaces were converted to oil; and so too were the coal-fired boilers that at one time provided most of the energy needed for industrial processing. In every way, we used oil and its derivatives as we would use superabundant sea water. Yet all the while they were becoming more and more scarce. Not until the OPEC countries began late in 1973 to raise crude oil prices dramatically was there a general awareness that energy was too valuable to be wasted. Even after 1974 when the real price of oil once again began to fall, it was widely believed that the scarcity was contrived, that OPEC would soon fall apart, and that petroleum could be used as recklessly as had been the rule for the preceding half century.

The formulation of a proper policy for energy has been frustrating and painful. This was especially true in Canada and the United States where the real price of gasoline and heating oil had been kept even below levels in other countries by taxing them more lightly.[1] It was very comforting at the time, but we have inherited a vast accumulation of heavy, massive-engined automobiles, spacious but heat-wasting houses, and factories still dependent on oil for most of their heat and power.

With energy growing scarcer it has become necessary to reduce the use made of it. That is a simple matter of arithmetic, and there are no policies to shelter any country from the difficulties imposed by the growing scarcity of energy. They would confront us eventually even if the main oil consuming countries were able to control the crude oil exports of the Middle East. Perhaps inexpensive energy will be available once more as technologies are developed for deriving energy from nuclear fusion or from the use of hydrogen as fuel. But we are likely to have to wait at least

1 To illustrate: in 1970 the tax per gallon (US) stood at 3 francs (=$0.54) in France, at 1.55 marks (=$0.42) in Germany, at 110 yen (=$0.31) in Japan, at £0.18 (=$0.43) in Britain, at 380 lire (=$0.61) in Italy, at $0.11 in the United States, and at $0.18 in Canada. And by 1979, while the Canadian tax had increased by a mere 44 per cent from 1970 and the U.S. tax by only 27 per cent, the corresponding figures were 123 per cent for France, 70 per cent for Germany, 261 per cent for Italy, 90 per cent for Japan, and 72 per cent for Britain.

several decades or longer before these developments can provide much relief.

Canada's position with respect to energy is nearly unique among the petroleum-importing advanced economies. In total energy, the country is at present almost self-sufficient, as Table 1 shows. There are some grounds for the belief that if energy prices rise high enough and if the technologies for exploiting underseas reserves and for extracting petroleum from the tar sands and upgrading it are developed, Canada can become self-sufficient in petroleum at least for a short while. But it would be irrational to conclude that Canada could then be spared the problems of adjustment to energy scarcity. The very great rise in price that must be assumed (for self-sufficiency) and the geographical distribution of its reserves guarantee that Canada will face terrible strains. Industries that consume a lot of energy will be seriously hit; so also will areas of the country that must import energy from other areas. (It is hard not to think of Ontario and the petrochemical and automobile industries in this connection.) Industries that demand only small amounts of energy and areas that produce it in great quantities will be the gainers.

By our choice of tools to achieve these cuts in energy use or these increases in energy supplies, we in fact determine, perhaps unwittingly, which industries are destined to wither away (unless they can adapt products or technology to more expensive energy) and which are likely to flourish; and we determine too how much income and wealth will be transferred from Ontario, Quebec, Manitoba, and the Maritimes to the OPEC countries and to our intra-Canadian OPEP (Organization of Petroleum Exporting Provinces). Even if no policy is changed, such decisions will continue to be made by the tax structure, and by the rules about prices for domestically produced petroleum.

The general problem: analysis

When the amount demanded at a certain price exceeds the amount supplied, there are only four possible policies and outcomes:

- The price itself may be allowed to rise (to the market level) as producers take advantage of the excess demand, or instead it may be pushed up by tax increases.

Alternatively, the price may be held at the original level or at any rate below the market price:

TABLE 1

Canada's petroleum and natural gas situation 1978

	Petroleum (bbls x 10^6)	Natural gas (cu. ft. x 10^9)
Consumption	670.2	1448.2
Domestic production	575.4	2330.3
Shortfall	94.8	-
Surplus	-	902.1
Conventional recoverable domestic reserves	8229.7	82 067.0
Non-conventional domestic reserves	314 450.0	-

NOTE: Petroleum refers to crude oil and products; consumption is primary requirements.

SOURCE: Statistics Canada User Enquiry; Canadian Petroleum Association, Statistical Handbook 1978.

- by government order; but if only that were done, shortages would appear;
- by limiting purchases through a rationing program, or by subsidizing increases in output;
- by reducing the income of buyers so that they lower their purchases of everything, including energy.

In the real world, government is likely to fall back on a combination of these policies. But in order to analyse their consequences we shall consider them as alternatives and see which is best.

Few would hold that energy policy should be determined solely on the basis of economic considerations - in the narrow sense anyway. Government certainly recognizes economic objectives, but in formulating policy it also has to bear in mind its social and political goals. In the analysis which follows, we are concerned with the economic goals that a responsible

government could be expected to acknowledge and to strive for. As will become evident, the economic analysis that is required is quite complex enough, without adding in the non-economic goals of government.

As with other complex economic problems we should expect to find that the policy which serves best in terms of one economic goal, such as getting buyers of the product to use it efficiently, is much less successful in terms of another goal, such as getting a fair distribution of the burden imposed by increased scarcity upon the residents of the country. We should even be prepared to find that the same policy is a failure in terms of a third goal, such as maximizing current income per capita. What such a situation calls for is a combination of policies, a mix of Policy A, Policy B, and so on. Resolutely doctrinaire answers, for all their appeal, are very likely to be foolish in practice.

The skills of the economist can be useful in asking certain crucial questions and in providing answers to them, thereby presenting information essential to the policy-maker. But policy can only be determined by the politician, who uses advice from the economist as one ingredient but who must then judge the relative importance of the several goals and the political, social, and administrative costs of the various policy options.

Increases resulting from the market

If government does nothing at all as scarcities grow more severe, prices will rise. These price rises, at the wellhead, at the refinery, at the gas pumps and delivery trucks, will bring about a fall in purchases; at the same time they will induce those responsible for supply - firms involved in petroleum production and extraction, upgrading, and refining - to increase their outputs.

That is the way the free market works in the ideal. Unfortunately there are reasons to doubt that it will actually work so smoothly in the short run.

The problem caused by unresponsive buyers

Most car owners cannot shift from gas guzzlers to highly efficient smaller automobiles as soon as the price at the gas pump doubles. The producers of small autos have to expand production and replace stocks in users' hands - a process that may take years, especially since the owner of a relatively new gas guzzler, though he might wish he had ordered a different car a year ago, is likely to find that the trade-in value of the car that nobody wants has now fallen so low that he becomes discouraged about making the shift quickly. Moreover, if there is anybody out there who does want to buy it, it will still be on the road and consuming more than its share of gas until it is scrapped. Likewise the shift from oil to natural gas, from large houses and apartments to more compact ones, and from an inside temperature of 23° to, say, 17°, will take time; and so too will the retooling of most of Canada's industries.

Empirical studies in the United States have attempted to determine how responsive has been the use of gasoline to a change in its price. In the short run, the response to any increase in price appears to be relatively low: for a 10 per cent increase in price, gasoline consumption seems to have fallen within a year, by anywhere between 2 and 6 per

cent.[2] In the longer run the response appears to be greater - as high as 8 per cent for a 10 per cent change in price. The most ambitious study finds that as much as 90 per cent of the total response arises from the necessarily gradual shift to more fuel-efficient cars and no more than 10 per cent from a reduction in miles driven. None of the studies consider the even longer-run responses to be expected as workers move closer to their places of employment and as the general shape and content of communities alter under the pressure of still higher gas prices (in real terms from two to five times their present level).

It should be possible to accelerate the process - in effect to move the long run forward in time - by giving ample notice that the price is scheduled to be raised by specified amounts at specified dates in the future. But such an announcement would only be effective if it is widely believed; and it will only be believed if there is a tradition of commitments for the future being honoured, rather than amended or reversed. Obviously no government can commit its successors to its program. But if the successor government makes a change in its own future commitments or in those of a preceding government, it may make the task of establishing the credibility of its announcements much more difficult.

The problem caused by unresponsive suppliers

The time needed to sink new wells, to explore for and locate fields that contain reserves large enough to be commercially attractive, to build the plant required for working the tar sands, to construct pipelines, and so on is again likely to be a matter of years.

Moreover, in so far as those who are responsible for decisions about the extraction rate from existing fields come to expect a rapid runup of price in the near future, they might well be tempted to leave the resource in the ground so that instead of selling it at today's high price they can sell it a few years hence at a very much higher price. In short, if a price

2 Several such estimates have been made, and most lie closer to 2 than 6 per cent. They are summarized in a study for the IMF undertaken by Alan A. Tait and David R. Morgan: 'Gasoline Taxation in Selected OECD Countries, 1970-1979,' 16 January 1980. Mimeo.

increase today creates expectations of additional very large increases in the future (a not too remote future), it may persuade firms to reduce instead of increasing the amount of crude petroleum extracted.

But there are also opposing pressures to be considered. For one thing, if government requires commercial production from any site claimed on the basis of success in exploration, the firm may be tempted to hide its success. But if the firm fears higher taxes (on output) later or, even worse, 'nationalization,' it may be tempted to overexploit its reserves, producing as much as possible while it can still earn high profits.

Once again it should be stressed that a government announcement that prices will be allowed to rise as far and as fast as market forces ordain - assuming that is its policy - will speed up the adjustment in output. But the announcement will be most effective if it is widely believed. Frequent changes in government policy that do not appear to have any clear justification may thus be counterproductive, creating obstacles to appropriate adjustment. Nevertheless, a revised policy that is seen to have very great advantages over the earlier policy is probably desirable.

Another complication on the side of supply arises from the fact that the major oil-consuming economies are substantial importers of petroleum. In recent years petroleum imports have grown less secure - less dependable because of the ever-present possibility of embargoes and blockades, and less attractive because of the risk of large and unpredictable changes, usually upwards, in the price charged. Thus the supply is quite possibly 'perverse' in the sense that a price increase might lead to a fall in output and is liable to be unstable as well.

The ideal reconsidered

These observations suggest that the amount by which price must increase to keep supply and demand in balance in the short run may turn out to be very great when everything is left to the market - probably much greater than for resources that are renewable. However, if the market is informed and has no reason to expect a change in the government's policies, the adjustment will occur more easily, entailing a smaller change in price. Obviously the government can help here.

In Appendix A below some of these points are demonstrated. It is shown that the less responsive the amounts demanded and supplied are to

any change in price, the greater the price change will have to be if it is to bring the amounts demanded and supplied together again following any development that has made them unequal. In Appendix B the analysis is extended to allow for petroleum imports. There it is shown that if the country is not self-sufficient in petroleum, its domestic price cannot rest above the price it has to pay for its imports of petroleum unless it levies a tariff or sets a quota on them.

But even if the availability of petroleum from abroad sets an upper restraint (though perhaps not a rigid one) upon the domestic price, it hardly makes for stability. Experience since 1973 surely demonstrates that the floor-ceiling is itself decidedly unstable, and that prices - quite apart from the effects of changes in government policies - cannot be expected to be at all stable in countries that must rely, even partially, upon imports.

Buyers are not likely to respond strongly to changes in energy prices. Nor are sellers likely to do so. And there are additional complications. For one thing the response of sellers can be perverse; with an increase in energy prices, they may actually reduce the amount of energy they make available. Such a result would be likely when sellers are led to expect an even more rapid increase in price in the future than they had earlier foreseen, as a result of an increase in energy prices. They may well then decide to reduce their output, holding back supplies in order to sell their product later at still higher prices. After all, unlike most firms, the producers of crude petroleum and natural gas have ample and very cheap storage facilities - the reserve pool at the bottom of the well.

Furthermore, because expectations about future selling prices are at best informed guesses about an unknowable and uncertain future, such estimates are notoriously vulnerable to wide fluctuations. In an ocean of uncertainty, everyone grasps at any straws available and exaggerates their importance. Thus, sellers' expectations as to the rate at which the price of a product will change over the next few months or years tend to change sharply from time to time, for reasons that, though perhaps superficial, reflect these uncertainties of speculation. It is not unusual to find sellers who would today be prepared to make, say, 1000 units available at today's price, tomorrow putting only 600 units on the market at the same price.

In technical language, the supply function is not only quite inelastic and sometimes perverse but may also be decidedly unstable. The instability of supply caused by rapidly changing expectations about future

energy prices is further enhanced by the fact that a very considerable part of the world's energy supply is purchased from countries that are now both politically unstable and often eager to use their control over exports for political ends.

The combination of an inelastic demand and supply, occasionally a perverse supply, and an unstable supply interfere badly with the smooth functioning of the market mechanism and seriously impair its efficiency in curing shortages or gluts through price adjustments. In most commodity markets a price change of, say, 20 per cent may be needed to cure a shortage, and the price rise will be smooth. However, with energy, the rise in price required to cure an equivalent shortage may turn out to be very much larger, possibly 200 per cent or more; the process may be very rough; and no sooner has a position of equilibrium been reached than it is liable to further disturbance.

As we turn to look at the consequences of increases in energy prices for the distribution of income, the rate of inflation, and the level of the economy's output, we must note that the Canadian economy can be buffeted by energy price rises of as much as 200 per cent in some years, and by frequent price changes. The idealized picture of the market mechanism scarcely applies to the real world's energy markets.

Increases resulting from government measures

A market-induced rise in the price of energy can be counted on eventually to restore equilibrium to a market that has been shocked out of it. For many economists, allowing the market to restore equilibrium would be not only the natural decision, requiring no tough government decisions, but also the best one.

However, their claim can be questioned and perhaps dismissed. Market processes may not work at all smoothly if participants face unusually strong uncertainties. Price changes may then be larger than the real situation demands, or smaller and far more frequent. More important, harmful side-effects may arise, as we shall see. These side-effects may be summarized as follows:

- The effects upon the distribution of income among the various income classes and among the regions of the country may run counter to the

public's standards of fairness.

- The effects upon the national income (or aggregate output) may be harmful, and if reliance is to be placed upon market forces operating in the petroleum sector to maintain equilibrium in that sector, the government may at least be called upon to adopt measures for income stabilization.
- The effects of large, market-induced increases in the price of petroleum and its products upon the inflation rate may be harmful. It should be clear by now that there is nothing, or at least nothing very strong, in the way of market forces that ordains that if some prices rise unusually rapidly, others will fall with equal rapidity. To put this point another way: the mechanism for achieving this result - general price stability despite very large rises in petroleum prices - may work only at a cost, measured by declines in the aggregate output of the Canadian economy, of many billions of dollars a year. Again then, the adoption of government measures to offset a rise in the inflation rate without plunging the economy into depression may be desirable.

Consideration of these harmful side-effects of market-induced changes in prices may persuade government not to rely upon the market alone for maintaining equilibrium. It may decide to impose a tax on the amount produced or sold to get the required reduction in the public's purchases of gasoline, oil, and natural gas.

Appendices A and B analyse the ways in which prices, domestic output (and therefore the rate at which domestic reserves are depleted), and imports would be affected by a tax (or subsidy) upon sales or output. There the following points are demonstrated:

- If imports are set at zero, the price would rise by something less than the amount of a newly imposed tax on each unit of output. Both energy output and energy purchased would fall by an amount that depended upon how responsive the amounts demanded and supplied were to a change in price.
- With no restrictions on imports, the imposition of such a tax would not raise domestic prices (which would remain at the price of imports), so that total purchases would be unchanged, but it would lower domestic production and lead to as large a rise in imports. However, if a tariff were levied on imports in an amount just equal to the new domestic tax,

the price in Canada would rise by the amount of the tariff, purchases would fall by a figure that depended upon the responsiveness of the amount of petroleum demanded to this rise in price, the level of domestic production would not change - except for the effects of changes in the expectations about future prices in the minds of the owners of petroleum reserves in Canada - and imports would accordingly fall by precisely as much as total purchases dropped, again with the same exception.

A government wishing to persuade consumers to buy less petroleum (and its by-products) would then have at least two options:

- allow the market price to rise to its equilibrium level and, either by levying a tariff on imports or by establishing a quota, modify the rate of import availability as a partial or complete safety-valve against price increases, or
- impose a tax on crude petroleum - but again the government would have to establish a quota or levy a tariff on imports.

But while the reductions in petroleum use would be the same, the other consequences of these two options can be very different. This matter will be explored shortly.

Higher prices and domestic supply in the long run

An additional argument for relying upon market forces to bring about an increase in price rests upon the belief that when the firms in the energy industries enjoy dramatically higher earnings they will be induced to undertake projects that will lead, after a time, to an increase in the short-run supply of energy. Such a shift would occur if important new reserves were found, if a new and improved technology for digging wells or getting crude petroleum to the surface were discovered, if the transportation or refining of petroleum were to be made more efficient.

Any optimism on this score must rest upon the belief that, though any firm knows that it would profit from its success in achieving a breakthrough, it is prevented from making the effort needed to do so by a shortage of funds. But if a shortage of funds stands in the way, why would the firm not solve its problem by borrowing? And even if adequate

funds can be obtained from its sales revenues, there is no guarantee that it will use them in ways that would lead to a rise in supply. A firm with high undistributed earnings must be either acquiring assets or reducing liabilities. Spending money in order to finance research and development is only one of the many options before the firm. It might instead buy up another firm in Canada or even abroad. If the government's concern with the country's balance of international payments persuades it to steer the economy towards self-sufficiency, it is far more likely to achieve that goal by assigning contracts designed for that purpose to qualified firms than by allowing some firms to enjoy massive increases in undistributed earnings in the hope that they will choose the option desired by government.

Government contracts in agriculture, in the aerospace industries, and in weapons research have been decidedly successful in inducing technological development, and there have been many instances in which highly prosperous firms have done far too little research and development to ensure even their own survival: the U.S. steel industry comes to mind.

The point is that raising prices (for petroleum and related products) by taxes might in principle enable Canada's petroleum industry to move the country closer to self-sufficiency provided the government used some, or all, of the resulting increase in tax revenues to finance the contracts for the steps that a self-sufficiency campaign would require. An alternative that would still call for higher taxes would be to assign responsibility to Petro-Canada.

Higher prices and the redistribution of income: by class

Allowing prices to rise at a rate that keeps the amounts of energy demanded and supplied close together is subject to another difficulty: it affects the various income classes in ways that many regard as unfair (it also shifts incomes from some regions to others, as we shall see later).

It has been shown that those at the low end of the income scale generally spend more than they earn - as much as 140 per cent of their income - on consumer goods and that the ratio of such purchases to income falls as income rises. At the other extreme, those at the top of the income scale may spend as little as 50 per cent of their income on consumer goods, or even less. Moreover, as Leonard Waverman in a paper presented to the Council's 1979 Conference on Energy argued, direct and

indirect purchases of energy account for about the same fraction of the total purchases of consumer goods at every income class. From these two observations it follows that the amount spent to purchase 'energy' as a percentage of a person's (or family's) income also varies inversely with income.

In more concrete terms, while a typical family with an income of, say, $10 000 a year will spend 10 per cent of its income to purchase energy, a family with an income of, say, $50 000 will spend a lower ratio for energy - say only 5 per cent; and one with an income of $6000 will spend more than 10 per cent - say 14 per cent. It follows that if energy prices are doubled (and if consumption patterns are unaffected), the family with the $10 000 income will have to pay an additional 10 per cent of its income for its energy requirement; the family with the $50 000 income will have to pay only 5 per cent more of its income to finance its purchases, at the pre-price-increase level; and the family with the $6000 income will have to raise its spending on energy by 14 per cent of its income.

A doubling of energy prices seems to have a stronger adverse effect (measured by the percentage of income 'lost') upon the poor than upon the rich. The fact that persons with lower incomes are closer to real discomfort than those with higher incomes is a second reason for being especially concerned about the consequences for the poor of a doubling of energy prices.

But this doubling of energy prices also seems likely to confer greater benefits upon high-income groups than upon those with low incomes, when account is taken of the relative gains in the incomes of the various income classes that higher prices would yield. A doubling of energy prices - assuming no change in output - would mean a doubling of revenues with no change in costs (because output is assumed constant). As a result, economic rents, most of which would show up as profits, would be raised by much more than 100 per cent. The ownership of firms in the petroleum industry is said to be relatively concentrated in the hands of those with high incomes. If that is true, a doubling of petroleum prices would take from wealthy buyers an especially small proportion of the incomes they earn and provide to them an especially high proportion of the newly created incomes. And it would affect those with lower incomes in exactly the opposite way: taking a higher proportion of their income to pay for

their purchases of energy and paying back to them as additional earnings a significantly lower proportion. Admittedly, this proposition depends upon two assumptions, presented here with insufficient qualifications. With the first - that the poor spend a higher proportion of their income upon energy than do the rich - there is little reason for doubt, unless all the current saving of the rich is later spent upon consumer goods. With the second - that a doubling of petroleum prices would yield especially large gains to the rich in the form of additional incomes - our conclusions rest upon no more than a surmise that increases in energy prices are much more likely to favour rents than wages and salaries, and that the ownership of firms in the energy sector is concentrated, as it is for firms in other sectors as well, in the hands of the wealthy.

If such a development - transfers from the poor to the rich - is judged to be seriously undesirable, then the tax-raising method of achieving higher energy prices seems to have an advantage over simply permitting producers to raise their prices as they would when supplies became short. The government can use some, or all, of its increased tax revenues to compensate those whose well-being is most seriously damaged by the higher prices of energy. The proposal in the budget presented to Parliament in December 1979 for a Refundable Tax Credit, in which those having lower incomes qualified for a larger percentage rebate than those with higher incomes, is one method of providing such compensation in a way that seems administratively feasible.

Higher prices and the redistribution of income: by region

Another aspect of 'fairness' or equity must also be considered. Under the British North America Act, the provincial government 'owns' the minerals within its boundaries, and presumably the province has the right to enjoy incomes earned in exploiting these minerals. If prices are allowed to rise in response to market forces, then, in accordance with the formula now in being, the government of Alberta and its residents will, along with the firms which have purchased the right to exploit these minerals, acquire almost all (90 per cent) of the 'gains.' It follows that a substantial price rise, with no increase in the federal government's tax rates (which assumes no change in the formula), would imply a massive shift of income

from residents of the oil-dependent provinces to the government of Alberta (and hence to its residents) and to the 'petroleum corporations' and related firms.

But if the federal government were to impose an excise tax on Canadian-produced crude petroleum, it would limit this shift; if the tax increase were high enough to bring demand and supply into line, it would even prohibit that shift absolutely. From the standpoint of the residents of Alberta and the shareholders of firms involved in exploiting Alberta's petroleum reserves, the absence of such a shift of income from the consuming provinces to Alberta and other energy-rich provinces would no doubt appear to be as unfair as its occurrence, on an enormous scale, would seem unfair to the residents of Ontario, Quebec, and other have-not provinces.

The task of the federal government in the face of this conflict of claims would be to develop a reasonable and fair compromise, and if it could not gain the consent of the provinces to its judgment even to impose it.

Higher energy prices and inflation

Energy price increases, whether market-produced or tax-driven, will affect the general price level both directly and indirectly. The cost of every good and service that uses energy as an input for production would increase, and their prices are very likely to be raised as a result. With prices for such goods as gasoline, home-heating oil, electricity, foodstuffs (because of higher prices for fertilizers), and many plastics being higher than they otherwise would be, labour is very likely to demand, and be granted, larger wage increases than it would have had without this first round of price increases. Higher wage rates throughout the economy mean still higher costs, and a second round of price increases could be expected to follow.

Higher costs lead to higher prices, which lead (through higher wage rates) to higher costs, and so on and on. Looking at this notorious cycle it is not easy to see why the results would depend upon what caused the initial rise in costs. Whether the first round of higher energy prices in the future occurred because of market forces or tax increases, the process would be much the same.

The cycle might be restrained if for any reason the demand for the products of the economy were to rise less quickly than costs. But then the consequence might be a reduction in the economy's aggregate output (or a slowing down in its rate of growth) rather than a slowing down in the rate of inflation.

If demand restraint is to contribute strongly to slowing down the inflation rate in our economy, it will probably work indirectly and slowly.

With costs rising and demand remaining constant or rising less quickly, the output of most firms would probably fall. Employment would drop too, and unemployment would rise. But when unemployment rises high enough and remains there long enough, the rate at which wages rise is also likely to fall. At the same time any tendency for profit margins to rise would probably also be weakened. Finally, for those (relatively few) products for which the relevant elasticity of supply is very low, a decline in demand may even lead directly to price falls, without lags. As a result the costs of production (including profit margins) would rise less quickly, and the inflation rate would decline too. But such a process would take a great deal of time, and the costs to society measured by the loss of output must be reckoned (for Canada) in the tens of billions of dollars annually.

A second source of pressure against rising prices should also be considered. The rise in energy prices may encourage firms to invest in more efficient processes - although as we have already seen they may not do so. If they do, and if costs fall, the upward pressures on prices caused by rising wage rates and energy prices will at least be weakened. However, since it takes time to order, install, and make operational the new equipment, this source of cost declines may only become significant after the cycle of higher prices leading to higher wage rates leading to still higher prices has become firmly established. And the declines in cost may be obscured.

If the rise in energy prices is instead brought about by raising the taxes levied on petroleum and natural gas, there is another possible restraint on a general increase in prices. Costs elsewhere in the economy could perhaps be made to fall by reducing the various indirect taxes on output that pervade the federal and provincial tax systems, such as sales taxes, excise taxes, and social insurance premiums. With such tax reductions, costs, except for energy-intensive products, could be kept

from rising - they might even fall - and price rises for all but energy-intensive products might be prevented or at least limited. The next round of wage increases to offset price rises would then perhaps be less explosive.

With price increases for energy occurring in response to market forces and with no assistance from higher taxes on energy, any reduction in the indirect taxes on the general output of the economy would aggravate the government's budget problems and so would be less likely to be adopted.

Analysis of the behaviour of demand following either a tax-driven rise in energy prices or a market-induced energy price increase gives but one reason to prefer the former over the latter. But the grounds for preference depend upon the government's readiness to use its increases in revenues from the higher energy taxes as a substitute for revenues from taxes on other products and on payrolls.

Higher energy prices and gross productive capacity

A rise in the price of petroleum, or, as we shall see, its increased scarcity if price is held down, has adverse effects upon both the economy's capacity to produce (in general) and its capacity to provide output for its residents in a suitable form. But any diminution under these headings would only become important if aggregate demand were high enough to bring output close to capacity, for only then would a reduction in capacity drive the actual level of output down.

The economy's 'capacity to produce in general' would be reduced by any substantial rise in the price of petroleum or, more broadly, by a growing scarcity even if prices did not rise.[3] In face of such a rise, producers would be driven to use substitutes, assuming any were available. But substitutes that are accepted only because the price of the first choice has been raised or its availability has become restricted must be less acceptable - or they would have been used before - and when they come into general use they lower productive efficiency. With productivity

3 Just as the economy's productive capacity would decline if the skills of its labour force declined as the result of illness or a long exposure to unemployment.

in many sectors of the economy falling, the economy's general capacity to produce falls too.

There is no way of reversing that penalty, at least in the short run. Over a longer time it may be possible to compensate for this reduction in the economy's productive capacity by adopting measures to raise its growth rate; but the payoff is uncertain, because raising the growth rate is difficult; moreover, even if it can be done, a number of years will surely be needed to make up for the loss.

Higher energy prices and specific productive capacity

The amount of output available to the economy's residents at capacity is only equal to its productive capacity if its residents want to use directly or indirectly exactly what it produces. Clearly Canada's residents do not have any direct use for most of its output of wheat, nickel, copper, and forest products, but we can use them indirectly by trading any surplus for the coffee, bananas, oranges, crude petroleum, and machinery that we do not produce in adequate amounts. When the price of so important an import as crude petroleum rises by, say, 1500 per cent, and other prices do not change, it means that Canada must surrender a larger amount of its output of wheat and other exportables to pay for an unchanged amount of coffee, etc. In other words, the 'terms of trade' with other countries become less favourable or move against this country. Even though Canada's actual output may remain constant, the amount of output available to it (of the varieties wanted) must fall.

When petroleum prices rose sharply after 1972 the terms of trade moved against Canada, and the maximum available output declined. As a mitigating force, Canada's export prices have risen too, but a good deal less rapidly.[4]

Higher energy prices and aggregate output: direct effects

Rapid increases in energy prices, no matter how they are brought about,

4 Canada (and other developed countries) had gained from the movements in the terms of its trade with less developed countries for most of the period 1946-72.

may set off an inflationary spiral. An increase in energy prices is no less likely to cause a fall in output (assuming nothing else is changed) and a rise in unemployment.

Again, the cause of the price increases does not seem to have much effect on the extent of the drop in the economy's aggregate output, though the locus of the first increase in prices - OPEC or domestic - is likely to have a considerable influence.

The essential cause of a fall in output is that unless there is a change in the government's macroeconomic policies a large rise in the price of petroleum would be almost certain to lower the aggregate demand for the economy's other products. Suppose OPEC raises its oil prices. When these changes have worked their way through the economy, (but before the resulting rises in wage rates have occurred), consumers will be forced to spend a good deal more than before if they are to use nearly as much gasoline and heating oil as formerly. With no change in their disposable (or after-tax) personal income, they will be left with less income to finance their other purchases, their tax payments to the government, and their saving.[5] Their response to this income decline cannot be predicted with certainty, of course, but there are empirical and theoretical reasons to believe that they will reduce both their saving and their spending to purchase the other products of the economy. Because of the reduction in their purchases of domestic output, suppliers would be very likely to reduce output; they may also reduce prices, but that seems far less likely. And as is well known, such a reduction in demand and the fall in income, which is merely another aspect of the same thing, will lead to a second and further fall in demand, which will be smaller, and then to a third, a fourth, and so on. The decline in output and income becomes in the final reckoning a multiplied fall in output and the national income.

Higher energy prices and aggregate output: indirect effects

There are several other ways in which OPEC's price increases could be expected to cause a decline in Canada's output. They have their origin in

5 If personal income taxes are not indexed, their personal income tax bills will also rise, and there will be a second subtraction to take into account.

two developments that, as we have already noted, are very likely to result from any sharp increase in the prices charged by the OPEC countries for their petroleum exports: a sharp deterioration of the balance of payments of the oil-importing countries and a speedup in their inflation rates. The direct effect on aggregate demand, and hence upon output and employment, of an increase in the deficit in the balance of trade (rather than the balance of payments) has been examined above. We look now at what the government is likely to do to curb the speedup in the inflation rate or to reduce the growing deficits in the balance of international payments. Moreover, countries facing massive increases in their import bills become exposed to very rapid growth in their international debt. We now look briefly at these topics.

When a country's balance of international payments worsens, in most cases the government moves promptly to raise interest rates and perhaps taxes. Canada is no exception. After OPEC's price increases almost all countries in the world except OPEC members are certain to face enormous deficits in their balances of payments, and each government soon understands that if it is to succeed in reducing its deficit it must proceed faster along this interest-rate road than the rest. And yet if all countries engage in this process of competitive deflation they can have no hope that as a group they can reach their goal unless their deflationary policies cause a reduction in their purchases from OPEC or lead OPEC to buy more from them.[6] It should scarcely be necessary to emphasize that there are other (and better) ways of reducing the petroleum importing countries' imports from OPEC. One simple step would be for the non-OPEC countries to bring the domestic price of their own petroleum up to OPEC's level. Total purchases would fall, though perhaps only slowly. Further assistance

6 Some relief from their combined payments deficits could be expected for two reasons. First, generally higher interst rates may persuade the OPEC countries to acquire securities from the oil-importing countries directly, or more likely through financial intermediaries. Secondly, as economic conditions in the petroleum-using countries deteriorate and income falls, their residents will be pressed by poverty to drive less and use less oil for home heating, and some factories will save on fuel oil because they will be shut down for longer periods; thus their imports from OPEC would fall. But even then any country falling behind the others in tightening credit will probably face either a continuing deficit or a steadily declining exchange rate.

might be required, such as a high tax on petroleum imports and a higher gasoline tax at the pump.

When the inflation rate increases, governments are also very likely to raise interest rates and taxes. But again these responses are likely to be unproductive; indeed they may be counterproductive. It is true that a general fall in demand may lead (eventually) to price falls, though empirical support for that claim has not up to now - even in 1974-5 - been persuasive. Next, with higher interest rates a country may manage to attract more capital from other countries, and as a result it can expect a rise in its exchange rate. If that happened the prices of its imports, measured in its own currency, would fall.[7] This should contribute to its battle against inflation, though probably at the cost of a rise in unemployment because with higher exchange rates its exports would decline.

But what is true of one country cannot be true of them all. All countries cannot simultaneously raise their exchange rates. If the U.S. dollar rises generally, that must mean the mark, the franc, the pound, the Canadian dollar, and other currencies are falling. Thus when one country does manage to revalue (upwards) its currency in foreign exchange markets, while it may well succeed in exporting some inflation to others, the latter experience even stronger pressure to protect themselves and to try, by raising their interest rates, to export their inflation.

Such a competitive effort to export inflation (and balance of payments deficits) was developing from January to April 1980. It put tremendous upward pressure under interest rates and taxes everywhere, so that it pressed aggregate demand down and with it employment and output.[8]

Financial collapse is the possible - some would say the probable - consequence of the enormous strains imposed by OPEC's recent price advances. Most countries find that they can finance their petroleum

7 This consideration may be especially important for OPEC's petroleum, which is priced in U.S. dollars. A country that has managed to get an appreciation of its exchange rate against the U.S. dollar is able to buy petroleum for less in its own currency, provided that OPEC's quoted price has not been raised. Clearly the United States cannot gain in this way.

8 The United States has recently embarked on a unilateral program of interest-rate disarmament, but most countries had not followed suit by the end of May. The U.S. dollar has fallen, but so too have employment and output in that country.

imports only by borrowing very heavily on the international capital market. Many of them, already burdened by very high external debt which must be serviced at fearsome interest rates, must add to their debt even more rapidly than formerly (say, from 1974 to 1979). Defaults on a wide scale seem more and more likely. Creditors - largely private financial institutions - find it difficult to escape very large losses. If failures are to be avoided, central banks will have to be ready to advance funds on a scale far higher than anything seen up to now. But that is precisely what the major central banks, which now face strong inflationary pressures, will probably be reluctant to do. With many debtor countries already very badly extended, their creditors, especially banks operating in Eurocurrency markets, are dangerously exposed. With every shock to financial markets, such as the 'collapse' of the U.S. bond market from early January to early April 1980 and the recent sharp falls in commodities' prices - gold, silver, even pork bellies - there is growing danger of a wave of defaults by debtors and of banks being forced to close. If this situation were to grow worse, and history provides many examples of such a process becoming cumulative, it could lead to a sharp decline in purchases of the economy's output, and the output itself would fall too. Thus there are several indirect ways in which a rise in the price charged by OPEC for its oil would press down aggregate output still further.

The special case of Canada

If Canada were fully self-sufficient in petroleum and if the domestic price were raised by the same amount, some of the unfortunate consequences of energy price rises, which really have to do with leakages abroad, would very likely be smaller. With higher prices for OPEC's oil, the greatly increased revenues that result contribute to a rapid growth in incomes earned abroad. But higher incomes earned in Saudi Arabia, Iran, Iraq, and Kuwait are not likely to generate a comparable or even a significant increase in the demand for imports from Canada into those countries, in part because Iraq, Kuwait, and the others are 'low absorbers' (of output). Instead, they accumulate deposits in Eurocurrency banks or purchase gold or U.S. Treasury Bills.[9] By contrast, if the price of Canadian crude

9 The sellers of the gold and Treasury Bills purchases by the OPEC

were to be raised, some of the gains would go to the residents of this country; and they, as their incomes rose, would be far more likely to buy more of the products of the Canadian economy. But even if the proceeds were received as income by residents of this country, abnormally large leakages could occur which would affect Canada's national income adversely.[10] However, if prices were raised through the imposition of excise taxes on oil, the funds would find their way to the government that imposed them. Provided the government used the additional tax revenues to finance purchases of domestic output that would not in the absence of these tax revenues have been bought, the cycle of more purchases leading to higher incomes at home leading to more purchases and so on is uninterrupted, except for the gradual increase in saving and taxes as incomes rise, and there is no substantial threat to maintaining aggregate demand at a high enough level. The cycle likewise would not be interrupted if the government, in response to the increase in its tax yield, reduced its taxes

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countries from their increased revenues acquire more money (a stock).

But they do not enjoy higher incomes - except for the decidedly unimportant case when the increased purchases of gold induce increases in the rate at which gold is mined - on account of OPEC purchases. And the same holds true when OPEC countries use the proceeds from their sales to build up their dollar deposits, now held more than ever in the so-called Eurocurrency banks.

Some economists argue that while Saudi Arabia and the other oil states do not directly increase purchases from Canada when their revenues from sales to Canada rise, they buy more from other countries, which in turn increase their purchases from Canada. If that were true then the enormous trade deficits of petroleum consumers following a large rise in OPEC's prices would be no more than transitory. But that is not what happened after the price increases of 1973-4, unless a period of five years, and a serious deterioration in economic conditions, and a marked slowing down in the rate of economic growth in the major consuming countries can be dismissed as transitory.

10 In so far as taxes (and royalties) paid to the government of Alberta were credited to that province's Heritage Fund, which used the proceeds to acquire Treasury Bills, or even Ontario Hydro Bonds, the process would tend to peter out. And there is not much difference then between the funds going to OPEC countries or to the government of Alberta. Nonetheless there remains a real point of contrast because some of the additional sums paid for Alberta's oil would finance increased payments inside Canada in the form of wages and salaries, rents and dividends, (except those paid to the United States) not only at the oil wells, but also for the use of pipelines, refineries, road transport, and retailing.

on other products or the rate of tax on income. Such refunds, which would clearly encourage consumers to increase their purchases, would therefore bring about an increase in disposable income, and this would help to maintain the cycle of higher incomes leading to greater purchases leading to still higher incomes etc. and thus tend to offset the adverse effects of higher energy prices (to OPEC especially) on income and hence on output. But if the additional tax revenues did not lead to additional purchases of current output, total output would probably fall.

Because this country contains very large reserves of petroleum, natural gas, and uranium, any rise in their prices - or, in the absence of a price increase for domestic output, a very large program for subsidizing domestic production - would offer a strong inducement to the private sector to step up its investment outlays in the energy sector in order to expand its capacity to produce. Higher investment outlays would help offset declines in consumer spending arising from the shift to an excess of imports on current account or other output-deflating developments. But it should not be imagined that the national income would automatically remain at prosperity levels. If interest rates rose too far, investment outlays might not rise enough to counter declines in the demand for other products. (We have noted several developments that might push interest rates to very high levels.) If business confidence were seriously impaired, say by a succession of financial crises, by a serious conflict between Alberta and the government of Canada over the price to be paid for domestic petroleum, or by a flareup of separatist sentiment, investment outlays might not respond adequately. But at least in its energy resources Canada possesses a factor that would help offset declines in output, and most other developed economies must get along without such a cushion.

The effects of higher energy prices: empirical evidence

OPEC raised its contract price very sharply between late 1973 and early 1980, concentrating most of the increases into two short periods: from late 1973 to early 1975 and from mid-1978 to early 1980. Have our views on how prices and levels of output would be affected been confirmed? And if some countries have managed to avoid serious spells of inflation or depressed levels of output, can we explain these exceptions?

The overall record for OECD countries - Western Europe, Australia,

Canada, the United States, and Japan - provides general confirmation. The inflation rate for the whole group stood at 5.2 per cent a year for the six years beginning in January 1967 and ending with December 1972. For the five years beginning January 1973 and ending in December 1977, the annual inflation rate averaged 9.7 per cent, or 85 per cent higher than it had been earlier. And the aggregate output of these countries was only 22 per cent higher than it had been five years before.[11]

The apparent exceptions: Germany and Switzerland

Between 1973 and 1977 the annual inflation rate in Germany and Switzerland stood at only 5.1 and 4.2 per cent respectively, a most attractive contrast to that of the OECD as a whole, which stood at 9.7 per cent. Did Germany and Switzerland have a secret weapon against inflation? Or is there a fault in our analysis?

One explanation does in fact stand out. OPEC's prices apply to (nearly) all countries equally. When it raised the price of Saudi Arabian Light Crude from $2.479 a barrel in January 1970 to about $24.00 a barrel and more in December 1980, every customer was subject to the same increase in the dollar price. But some countries, most notably Germany and Switzerland, were able to buy OPEC's petroleum at a price in their own currencies which increased by only 400 per cent to 600 per cent instead of by 1000 per cent (the rise in the United States). OPEC's prices are set in U.S. dollars. Any country whose currency appreciated strongly against the U.S. dollar during the period has experienced a less rapid rise in the price it has had to pay in its own currency for OPEC's petroleum. Since the mark appreciated slightly more than two times and the Swiss franc by 2.3 times between 1973 and 1978, OPEC's price hikes have been less serious for their inflation rate.

That is not the whole explanation of course. For one thing, it does not account for the high prices of these two currencies. Moreover, workers in one country surely responded differently to price changes, to

11 Admittedly aggregate output for the OECD group has increased, but the increase has been much smaller than for any previous period of the same length back to 1949.

expectations of price changes, and to unemployment than did the workers of other countries. In addition, countries have adopted somewhat different goals, with high employment assigned a stronger priority in some countries[12] and the control of inflation in others. And there are other differences, such as the attention paid by German producers to the design and quality of their products. But when our concern is the effect of OPEC's price rises upon the inflation rate and the level of output, the fact that the price of petroleum rose at a significantly lower rate in Switzerland and Germany than it did in other countries is surely relevant; and it tends to confirm that increases in energy prices help explain rising prices in general, as well as a decline in a country's aggregate output.

Summary: effects of a rise in energy prices

In the introduction it was stated that a substantial rise in energy prices would probably have serious effects upon the Canadian and provincial economies. In broad terms, the effects would depend not only upon the size of the increase in energy prices but also upon whether the higher prices are for petroleum purchased outside Canada or for domestically produced petroleum. They would depend as well upon whether the prices have risen in response to market pressure and are therefore all paid to producers, or in response to tax increases in Canada and are therefore paid over to government.[13]

The unqualified results are set out in Table 2. We consider three different price increases: an increase in the price of imported petroleum, an increase in the price of domestically produced petroleum when the additional proceeds are paid to producers, and an increase in the price of

12 The avoidance of high unemployment is obviously more important in a country which relies upon its own labour force than in another such as Switzerland or Germany in which 'guest workers' once constiuted one-third or more of the labour force and could be sent back to their own countries if they lost their jobs. It will be interesting to see whether the German and Swiss governments can so easily neglect falls in employment now that their guest workers have, since 1973, almost disappeared.

13 If all the qualifications were taken into account, the summary would not be much shorter than the text of the analysis itself. In order to make its main points clear, the qualifications are overlooked here.

TABLE 2

Summary of the effects of a rise in energy prices

Area where effects are felt	OPEC energy prices up	Domestic energy prices up	
		Through market forces	Through taxes
Domestic energy supply - long run	Possibly favourable in long run	Probably favourable in long run	Favourable provided government places orders wisely
Redistribution of income by income class (domestic)	No appreciable effect (though the increased price hits low incomes hardest)	Large shifts from poor to selected rich	Large shifts from poor, but government can use tax revenues to compensate
Redistribution of income by regions	From Canada to OPEC	Large, from consuming provinces to Alberta, etc.	From consuming provinces to areas selected for government aid
Rate of inflation	High	High	High, but government can use tax revenues to subsidize output of products not energy-intensive
Gross production capacity	Falls	Falls	Falls

Table 2 continued

Area where effects are felt	OPEC energy prices up	Domestic energy prices up	
		Through market forces	Through taxes
Specific Production Capacity	Falls	Neutral	Neutral
Aggregate demand and hence output	Falls	Probably falls	Falls unless government uses proceeds to increase purchases or to other taxes.
Aggregate demand, indirect influences	Probably falls	Probably falls, but less sharply	Probably falls, but even less sharply
On output: special case of Canada with its reserves	Favourable effect in long run possible	Favourable in long run more likely	Result depends upon use government makes of its increased revenues

domestically produced petroleum that results from an increase in the tax on each unit of petroleum, the rise in proceeds being received by the government. For each of these classes, we consider how various aspects of the economy would be affected. Thus, it will be seen that when OPEC's price is raised faster than before, the general inflation rate will be higher than before, and Canada's GNP (or output) will be lowered.

THE EFFECTS OF HOLDING ENERGY PRICES CONSTANT

If no further measures are taken

Instead of allowing, or perhaps pushing, energy prices to rise as energy becomes scarcer, the government may rule that prices at retail be held at their former level. Such a policy is one the public would be tempted to support. The danger is that people may be deluded into believing that since the ordinary index of growing scarcity (rising prices) shows nothing, there is no real scarcity. Such a policy was adopted in the United States in 1978; the gasoline shortages in California that followed provide a vivid picture of its consequences.

Assume, to begin with, that nothing is done to maintain supply, even at its reduced level. With no rise in price, the public would presumably have no reason to reduce its purchases. But with the amount supplied certainly lower than it would otherwise have been and purchases at least as high, it is obvious that buyers would be unable to get all they wanted. Long lines of motorists would form at each gas station, and some of them would discover, after waiting for hours, that there was none left for them.

The queues can be shortened, but the shortages themselves will not be eased, by the adoption of a rule that only cars with even-numbered licences can purchase on, say, Monday, Wednesday, and Friday and the rest have to buy gasoline on the other three days. In fact, lines could be made to disappear almost completely if each hour of the working week were assigned to a specified 1/48th of all the cars in the area and in that hour only permitted cars could stand in line. But that change would be only cosmetic; shortages would continue to be as serious as they had been, or grow even worse. However, since most of those in need of gasoline would not be free to line up at their allotted times, the visitor from Mars might conclude that all was well; he might not see the lines of cars waiting to be allowed to join the queues at the station.

The inadequate supplies would be obtained by those who could afford to take the time to wait for the station to open. For house-heating fuel, orders from old customers and from those who had always paid promptly would have a far better chance of being filled. The rest could freeze.

Such a 'system' obviously would not be at all satisfactory. It would provide no incentive to economize for those who were confident that they could buy as much as they wanted. The separation of the lucky from the unlucky would not reflect the intensity of their needs or the justice of their claims. Besides, the amount that producers would make available would probably be curtailed, because they would probably regard the price offered as far too low.

Admittedly, in a purely formal sense, price controls may be less inflationary - provided black markets do not develop (a decidedly unrealistic assumption). But with reduced incentives to produce, the aggregate output of the economy could be expected to fall because the deficit in the balance of trade would be even worse than if prices had risen; and unemployment would also rise unless the millions of hours spent waiting in line were counted as work.

In short, a policy of simple-minded price controls would be a recipe for disaster.

However, if the country depends upon OPEC for most or all of its supplies, price controls at the retail level could only 'work' if the government were to pay subsidies to the refineries and dealers to cover the difference between OPEC's price and the controlled price.

In some respects such a policy would be slightly better than one under which prices were controlled but with no subsidies.

For one thing, the pressure on the domestic price level from the rise in costs would be avoided. With the prices of gasoline at the pump, industrial fuel oil, and heating fuel unchanged, the money costs of producing the rest of the economy's output would not be changed either. The economy would be 'protected' (partially, anyway) from shocks administered by OPEC. But with energy prices unaltered there would be no reduction in purchases and no pressures to adjust the inventory of cars, the design of houses, and the utilization of energy to produce power for factories. As a result, the level of subsidies would probably grow more and more rapidly.

Some growth in subsidies would no doubt be helpful as an offset to the effects on aggregate demand of the leakages abroad. But if subsidies continued to grow, they might generate inflation not from the force of rising costs but instead from that of rising demand, or if not from that source then from a decline in the foreign exchange value of the domestic

money. (With no restraint from rising energy prices upon purchases of petroleum, the value of imports could be expected to climb swiftly.)

Still, keeping prices to the buyer at their former level would mean that no signal had been given to indicate that supplies were becoming scarcer and no inducements to conserve had been provided. Imports would grow; the balance of trade and the balance of payments would worsen; and without subsidies to domestic producers of energy as well, the domestic output of energy would fall. With no provision for assigning scarce supplies to competing buyers, those whose incomes were below average would probably not be able to get any more than they could have obtained with prices rising freely. Indeed, if the subsidies were not made conditional on adherence to the price ceilings - and such a commitment would be very difficult to monitor - it is not at all clear that black markets could be suppressed.

With supplies of so critical an input becoming more expensive or more uncertain, black markets would take root, and the economy's productive capacity would fall too. As the terms of trade shifted against Canada, its capacity to supply output in suitable form to its residents would also drop. In short, price controls even with subsidies deserve no endorsement.

Further measures: rationing

The most serious objection to relying wholly upon the market to solve the problem of energy shortages is that it would massively alter the distribution of income and wealth between income classes and regions. It would also worsen the already serious problems of inflation and unemployment. If taxes were used to push prices higher, the distribution problems could be made less intolerable and the supply problem could be eased; but without supplementary policies inflation would be just as severe, and so too would unemployment. With price controls, the decision about who would get how much would be shifted from 'those who could afford to pay very high prices' to 'those who were lucky or influential' or who could afford either the time to 'stand in line' or to pay someone else to 'stand in line' instead. (Which does not sound like a real improvement over allowing prices to rise!) Price controls without subsidies would break down in a jungle of black markets anyway - and unofficial inflation would proceed as rapidly as official inflation would in a free market.

The next step beyond price controls would be to order rationing for all petroleum products, and presumably too for all products that have an important energy input (gasoline) and that are judged to be important for welfare (many agricultural fertilizers).

If rations are set to bring purchases (at whatever is thought to be a suitable price) into line with supplies (at the same price, unless a subsidy is paid to producers), no price controls are needed. (And yet without subsidies or rationing, price controls will not work.) Nevertheless rationing is subject to serious (and sometimes misconceived) objections. Let us look first at some of the misconceptions:

- 'Rationing introduces shortages. Without rations we could all have as much as we want.' This is a frequent complaint, though it is unjustified. Those who would have been able to pay a price much higher than the ruling one are unable to purchase more; but their hardship is offset by the larger purchases made possible for those who, in a period of scarcity, could not have paid the free-market price. A ration scheme redistributes the scarcity; it does not create it.
- 'Rationing reduces supply because the sellers are limited in the price they can get.'

This complaint has some merit unless the government pays subsidies to encourage the production of anything regarded as very important. Subsidies, though frequently hidden, are already a feature of fiscal policy, though sometimes they do not increase the output of anything important.

- 'Rationing introduces a bureaucracy, which means waste. It is also subject to abuse.'

This charge has far more merit. If rationing is limited to a single sector - energy - it need not seriously distort the functioning of the market economy, certainly no more than the perverse behaviour of energy prices did for decades. But it may not be possible to limit the scope of rationing. The charge that it is wasteful may seem diminished when set against the quite different but certainly not negligible waste created by the earlier malfunctions of the market mechanism. That it is subject to abuse is much harder to answer. It is probably true, but compared to the abuses created by black markets, which would be inevitable otherwise, the charge does not seem terribly serious.

If rationing were introduced at the consumer level, a corresponding

arrangement would be required for curbing purchases of petroleum for use in products that either do not come onto consumer markets or absorb only small amounts of petroleum.[14] Allocations to producers are likely to be required also, and that means further rationing. A bureaucratic apparatus would be needed there too, and it would be exposed to all the temptations for abuse that the possession of power over fortune provides. Moreover, any method of allocating energy would require detailed administration, which means that the skills and time of many persons who might otherwise be able to contribute to the nation's output are taken out of use. Even more serious, if petroleum were subject to rationing, the demand for some of its substitutes - hydroelectric power, natural gas, coal - would increase, perhaps by a large amount. Should these products be rationed? Or should their prices be allowed to rise to their revised equilibrium level? Once rationing is introduced for one important product, strains in other parts of the market are likely to develop, and an extension of the rationing system becomes difficult to resist.

More generally, rationing is one way of dealing with the charge that, for petroleum and its products especially, an unqualified reliance on the free market when scarcity becomes serious is likely to cause gross and regressive changes in income distribution. A program of rationing can prevent these changes, provided it can be kept reasonably simple.

It can also serve as a defence against one of the major sources of inflation.

And by limiting purchases, and hence imports, it can reduce the chance of a sharp drop in aggregate output.

But a further difficulty with rationing must be faced. Canada is not now, and may never become, self-sufficient in petroleum. If the ration is set at a figure that entails some petroleum imports (though presumably on a reduced scale), the government would surely have to pay a subsidy to importers - the amount of the subsidy representing the difference between OPEC's price and the market price at the reduced level of demand. This is not necessarily objectionable, but it must nevertheless be acknowledged.

If no subsidy on imports is to be paid, the ration would have to be set so low that total purchases would be choked down to the level of do-

14 There could be a two-price system, with prices for products subject to ration set deliberately low and prices elsewhere set by the free market.

mestic output. In these circumstances the price would certainly have to be raised to a level well above OPEC's. Would such an increase not be subject to serious objection? Would it even be politically viable?

One proposal for dealing with this objection, and with the related assertion that those with a great deal of money and an urgent demand for the product should be able legally to satisfy their demand, is to provide everyone with a free book of ration coupons and allow for their legal sale and purchase perhaps through banks.

Such a scheme would enable some to consume more than their allowance, but at a high price; and it would reward those who consumed less by enabling them to sell their unused tickets (also at a high price). Such an arrangement would discourage users from wasting gasoline just as effectively as would high prices. To anyone, the effective price of gasoline would rise to the very level it would have reached under free-market pricing, yet since the proceeds from the sale of excess ration coupons are transferred not to suppliers of petroleum but instead to those who manage to use less than their allowance, it is probably less subject to criticism on grounds of equity than a rapid rise in the price charged by energy producers. Indeed, since this arrangement would automatically dispose of the complaint made against the tax option - that it is regressive in impact unless a refundable tax credit is geared to it - it may be seen to have an advantage. Finally, a ration scheme could also, like a proper tax system, help modify the regional shifts in income that would accompany producer-led increases in the price of energy.

Nevertheless, a system of excise taxes with subsidies (or refundable tax credits for those with low income), combined with a reduction in taxes on products other than petroleum to offset the inflation-spurring effect of the oil tax, could do precisely what a ration scheme together with a free market in ration coupons would accomplish, and with far less risk of abuse and fewer government controls.

The scarcity of energy sources is likely to get worse for some years and to be eased only after we have learned to put innovative technologies to use on an enormous scale. Rationing deals best with short-run scarcities. It is very doubtful that it could work efficiently over the long run. It is too inflexible, it demands continuing intervention by government, and it is unpalatable politically.

But in so far as we attack only the symptoms of an increasing scarcity of energy - inflation and balance of payments deficits - by raising interest rates and general taxes, we are in effect choosing measures to deal with the scarcity itself, measures that seem to be inefficient, inequitable, probably counterproductive, and threatening to the very system they are intended to protect.

Further measures: reducing national income

Governments when faced with serious balance of payments difficulties and raging inflation caused by the growing scarcity of energy seem to be tempted by measures that work only through lowering income and output.[15] But it is an ill-advised policy, adopted only because in a quite different context it has been used so often that it has become respectable.

Admittedly, lowering income and output will reduce demand and so help in its way to reduce scarcity. A businessman on the brink of bankruptcy is unlikely to overuse his car; the worker who has lost his job will not be a gas-waster. But surely no one could be satisfied by such a way of sharing the sacrifices that an overall shortage imposes, because they are neither shared fairly nor limited in size; indeed, the sacrifices as a whole are multiplied.

A reduction in national income does nothing to stimulate an increase in supply; indeed it is counterproductive. In a depressed market, firms would clearly be unready to take chances on risky exploration, on developing new products, or on expanding capacity to refine crude petroleum.

As a strategy it is probably not even effective against inflation in the short run. In the period 1929-33 when national income fell, prices were slow to follow, and there are persuasive reasons for suspectng that they have since become even less flexible (downwards). In fact, it is doubtful whether any society subjected to this treatment would survive to experi-

15 This is not to say that government wants them to work in that way. It might reflect government's unreadiness to distinguish one source of inflation from another. But a failure to make such a distinction amounts to treating every fever, no matter what its cause, with the same pill.

ence the legendary Long Run.

Yet unsatisfactory as a policy of reducing income appears to be, it often gets first call in countries with severe balance of payments deficits and a growing scarcity of energy or its consequences - an extreme runup in the prices charged in that key sector and the spur that that provides to inflation. In such circumstances taxes are likely to be raised - though apparently last of all on the products which have become especially scarce - and interest rates are savagely pushed up. We are told that we must now 'bite the bullet,' 'pull in our belts,' and join in an orgy of self-sacrifice.

But in so far as we attack only the symptoms of an increasing scarcity of energy - inflation and balance of payments deficits - by raising interest rates and general taxes, we are in effect choosing measures to deal with the scarcity itself, but with measures that seem to be inefficient, inequitable, probably counterproductive, and threatening to the very system they are intended to protect.

CONCLUSIONS AND POLICY RECOMMENDATIONS

The preceding analysis suggests some general principles on which a detailed energy program could be based.

The general rules to which the analysis appears to lead are these:

1 Since whatever is done in connection with energy is very likely to affect the economy's operations in a number of different ways, it seems desirable to reaffirm the various economic goals towards which policy should aim. If these goals are neglected there is a danger of too single-minded an approach, too zealous a concentration on one objective - say to improve the efficiency of energy use. As a result the economy will do less well than if strong efforts were being made to reach other important goals as well.

We take the fundamental economic goals to be the following:

(a) The use of energy should be efficient, which means energy should not be wasted in satisfying one set of wants while other more important uses for it must do without.

(b) The sacrifices imposed on society by the growing scarcity of energy should be distributed fairly.

(c) The regional shifts in income that the increasing scarcity of energy makes inevitable must conform to, or at least approach, standards of fairness.

(d) The level of output of the whole economy (the price-deflated GNP) should be kept reasonably close to capacity.

(e) The interests of tomorrow should not be overlooked for the gains of today; tomorrow's users should not have to face stark deprivation so that today's users may surround themselves with energy affluence.

(f) The need for government administration and individual compliance should be predictable, reasonable, deserving of support, and effective.

(g) The output of Canadian crude oil and natural gas should be set with due attention to the possibility that energy-rich countries may stop exporting to us; alternative sources of energy should be developed to reduce demand for imported products, and users should be coaxed into regarding energy as precious.

2 With so many goals to reach (or, more realistically, to approach),

reliance upon a single policy is very unlikely to be as satisfactory as a package of several policies. But even with the 'ideal package' it would be unrealistic to expect economic conditions suddenly to become better than they were before the scarcity of energy was recognized, when petroleum was sold by exporters at an unsustainably low price. After all, when a resource so vital to efficient production is suddenly seen to be in short supply, and when countries in control of the major reserves realize their power to gain enormously in wealth and income at the expense of their customers, consuming countries are bound to suffer. Shortages of this kind are clearly not good for OPEC's customers. The best that can be hoped for is that sensible policies will minimize the injury and damage that current and future developments in this field seem nearly certain to impose upon us.

A suitable policy would have the following elements:

1 To achieve greater efficiency in the use of petroleum an increase in its price must be allowed (or forced by taxes). Generally, prices should be raised to the Chicago benchmark price or to the world price, although a case can be made for proceeding with all deliberate speed rather than abruptly. Prices at all levels - crude, refined products, at the gas pump, and from the delivery truck - would then rise.

The importance of increasing the price to users to realistic levels is vital. Only by appropriate pricing can effective conservation be achieved. Subsidies to keep oil prices low, entailing balance of payments deficits, are not viable in the long run. Rationing, although a useful measure for a temporary emergency is a cumbersome, costly, and inefficient policy if adopted as a permanent solution. Shortages, queues and depression are clearly far from optimal. A nation that responds to an oil shortage by subsidizing gasoline consumption while continuing to tax bicycles and shoes and that subsidizes oil for heating while taxing blankets and warm clothing is clearly giving consumers strong encouragement to waste oil when they should instead be encouraged to conserve it and use it efficiently.

With a view to reducing Canada's dependence upon unstable sources of supply, either a special price advantage or a system of subsidies should perhaps be established in favour of firms that extract crude petroleum from tar sands or from especially difficult undersea wells. These price

advantages and the costs of the subsidies need not be covered by prices at retail since the whole of society would gain from some insurance against stoppages, and general taxes could legitimately be used to cover such extra costs.

In determining how much of the proceeds from higher prices should go to the federal government (through federal taxes) and how much should be taken by the provincial governments (Alberta and other producing provinces) and the producing corporations, attention would have to be paid to considerations of equity (by income class and by region), supply, the maintenance of prosperity, the relative claims of the future and the present, and any problems of administration that would arise.

Furthermore, taxes are now determined at several levels of government and rarely co-ordinated. An increase in taxes would be advisable but only after measures for effective co-ordination have been implemented. Secondly, there are serious tax loopholes in the energy sector that should be closed. And third, profits in the energy sector are likely to continue their rapid rise. If, as is often claimed, a large share of these increases leaves this country, modifications in the basic tax on energy sector profits may be desirable.

Political issues will affect the purely economic factors listed here. Though there is no reason to believe that a formula once worked out would be appropriate at all future times, changes should be made rarely and only some time after adequate public notice. Uncertainties in the energy sector will surely be great enough to interfere with efficiency in the firm's planning without aggravating them through government policies that change frequently.

2 To promote the domestic output of energy over a period of years, it will be necessary to pay in some way for exploration, the development of new fields, and additional pipelines. A mix of higher prices to producers and government contracts for specific projects seems appropriate. The importance to be assigned to these two incentives should be determined after analysing the structure of each part of the oil industry, patterns of ownership including residence, the experience with these alternatives, and the problems that each creates with respect to equity, maintaining prosperity, and the other objectives of policy.

3 The necessary substantial increases in oil prices, whether achieved by market pricing or taxation, will make consumers worse off than they

otherwise could be, but the alternatives are worse still. However, such increases will make apparent the fact that the oil crisis must inevitably reduce our standard of living. To the extent that the price is increased because of higher taxes on gasoline and other oil products the resulting increases in revenues will allow reductions of sales and excise taxes on other goods, thereby offsetting, at least partially, the impact on the cost of living. Our indexed personal income tax system automatically provides some cushion for families subject to this tax, but further relief to those hardest hit - for example to those whose income is so low that they pay little or no income tax - may still be necessary. How extensive such additional relief should be is a question for political judgment, but it will be better achieved by transfers of income than by the continued inefficient subsidy to keep oil prices down.

4 The differences in the effects of increased oil prices on different regions of the country will be partly offset by existing systems of taxation and equalization payments, but as these now stand they may well be judged inadequate. The challenge to politicians is to devise an equitable and efficient system of income transfers to replace the inefficient policy of subsidizing oil to keep its price low.

5 Arrangements for imposing rationing should be made well in advance and kept current. However, rationing should be used only for such emergencies as a blocking of imports (or an embargo upon exports of petroleum by OPEC) or interruptions to the flow of Canadian-produced petroleum to regions that normally receive it.

6 The impact of OPEC's price rises will be deflationary for income and inflationary for prices. Measures adopted in Canada to share the burden more fairly may accentuate these problems. A co-ordinated policy to ease this problem of 'stagflation' should be adopted, including measures not only to maintain demand but also measures to raise the aggregate supply function for the Canadian economy. This proposal is critically important, because unless the Canadian economy is kept prosperous some of the other recommendations will be very difficult to implement. However, if the economy can be stabilized at a prosperous level and price rises can be slowed, we believe that our proposals will be acceptable and effective.

APPENDIX A

D_1 and S_1 in Figure 1 and 2 represent the initial demand for petroleum and its supply to the economy. No imports are admitted. When demand rises to D_2 and supply falls to S_2, the price will rise to P_2 (from its original level of P_1). The rise in price from P_1 to P_2 will bring the amount demanded (at P_1, and after the demand has increased) down from q_3 to q_2. It will likewise cause an increase in the amount supplied from q_6 (at P_1 after the supply has fallen) to q_2. It will be seen by comparing Figure 1 with Figure 2 that if the demand and supply curves are very steep, the rise in price required after the initial equilibrium is disturbed by an increase in demand or a fall in the supply will be very much larger than when the demand and supply curves are more nearly horizontal. There are reasons, set out in the text, for believing that in the short run both the demand and supply curves are relatively steep.

In Figures 1 and 2 the imposition of a tax on petroleum will lower the supply still more (to S_3). The vertical distance from S_3 to S_2 should be equal to the amount of the tax per unit of product. In this situation, the effect of such a tax is that producers will lower their output from q_2 to q_5; at the same time the price of the product will be raised to P_5 following the increase in the tax. From the standpoint of conserving petroleum reserves, raising the tax would prove to be a helpful step.

If instead of imposing a tax the government had elected to subsidize the output of petroleum, this could be represented by a shift in the supply curve, in Figures 1 and 2, say from S_2 to S_1, where the vertical distance between S_2 and S_1 represents the per unit subsidy. The consequences of such a program are clear. The price would be lowered, from P_2 to P_4, assuming that the demand for petroleum remained at D_2; but the level of output and hence the rate at which petroleum reserves were being depleted would rise from q_2 to q_4. A subsidy for petroleum production would accordingly reduce price (and, in a dynamic context, the rate of inflation); but it would also accelerate the depletion of the country's reserves.

Figure 1.

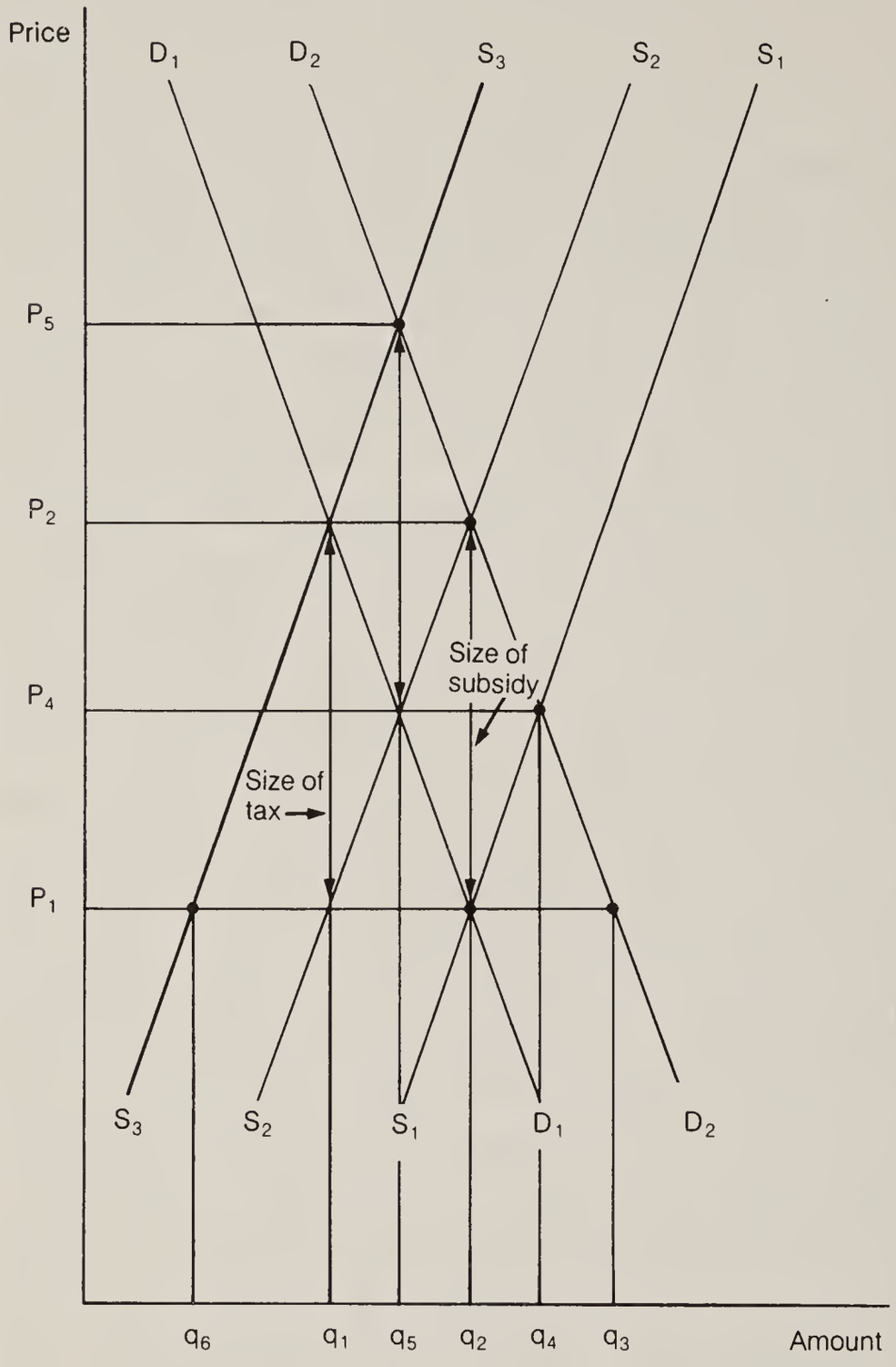
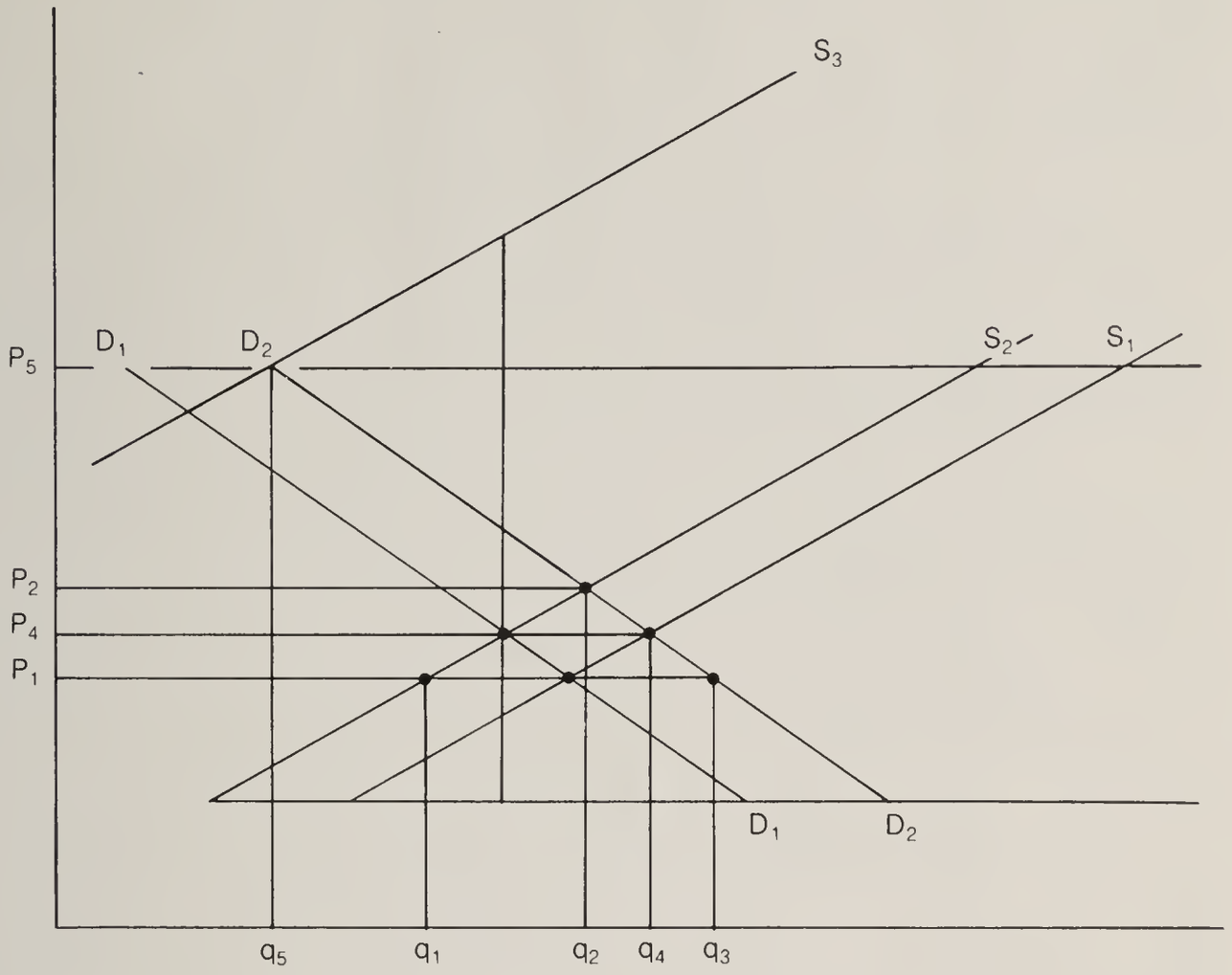

Price
D1
D2
S3
S2
S1
P5
P2
P4
P1
Size of subsidy
Size of tax
S3
S2
S1
D1
D2
q6
q1
q5
q2
q4
q3
Amount

Figure 2.

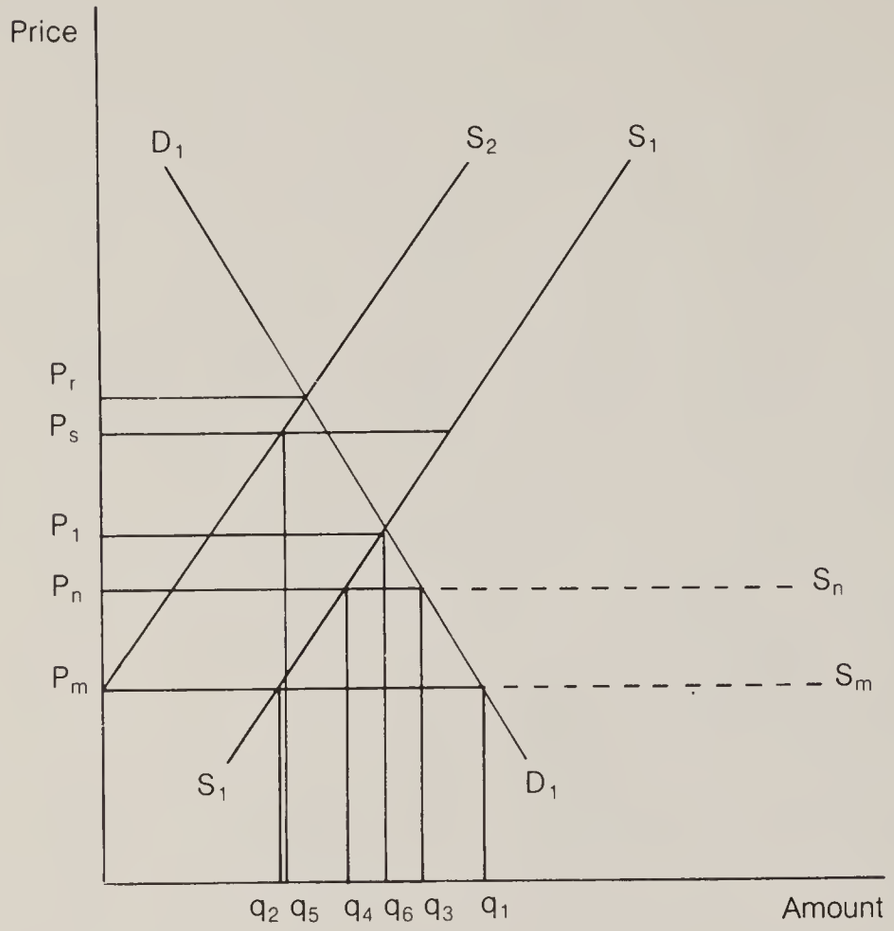


NOTE: The increase in demand from D_1 to D_2 provides for the same increase as in Figure 1 of the amount demanded at each price; the same with the fall in supply. The tax and subsidy also correspond to those assumed in Figure 1.

APPENDIX B

The analysis becomes somewhat more complicated for the more realistic situation in which imports of petroleum are allowed. We begin with the case in which imports are not restricted in any way. We assume too that for the current period the exporters are willing to make as much petroleum available as the country wants at a fixed price, P_m. In Figure 3 the supply of imports is then denoted by S_m, and D_1 and S_1 are respectively the domestic demand for and the domestic supply of petroleum. (Note that if there were no possibility of purchasing petroleum from outside the country, the uncontrolled price would have been P_1.)

Figure 3.



The availability of imported petroleum at P_m will effectively keep the domestic price from going above that figure, granted our assumption that imports are free and available in any quantity at that price. In the situation illustrated here it should be clear that the price would hold at P_m; in a free market domestic producers would not be willing to make available any more than q_2 at the price P_m; but buyers would want to purchase q_1. Nevertheless, though there is an excess of the amount demanded at P_m over the amount supplied by domestic producers, imports would serve as a safety valve. Since buyers are prepared to purchase q_1 when the price is P_m, and at that price the domestic output is only q_2, there would be a shortage of $(q_1 - q_2)$ units, which in a free market would be just filled by imports.

An increase in the price of imports to P_n, with no change in either domestic demand or domestic supply, would bring the equilibrium price up

to P_n and would also cause a reduction in the amount purchased from q_1 to q_3. Furthermore, it would bring about an increase in domestic production from q_2 to q_4. As a result, while purchases would fall, imports would decline to $(q_3 - q_4)$ or by even more than the fall in purchases - by the sum of $(q_1 - q_3)$ and $(q_4 - q_2)$. The rate of depletion of domestic reserves, however, would increase by $(q_4 - q_2)$.

If the exporting countries were to raise their selling price, to P_r say, then unless there were changes in domestic demand or supply, the price itself would not rise above P_1, and imports of petroleum would drop to zero. The country would be self-sufficient, and further increases in the price charged by exporting countries would be of no consequence; or so we might be tempted to conclude.

But such a conclusion, as we have noted, makes two assumptions: that the increase in the price charged by petroleum exporters would leave the domestic demand unchanged (which seems probable) and that it would also leave the domestic supply unaffected (which seems unlikely). There is one compelling reason for expecting the domestic supply function to shift as the result of an increase in the import price: such a price increase would probably suggest to domestic producers that they could, if they wished, export their output to other countries at a price higher than they could get on the domestic market. It would be only natural to expect them to reduce the amount they would then make available to the domestic market at each price, preferring instead to sell their output to other countries; or to leave it at the bottom of the well until the price had risen. As a result the supply would fall - say to S_2. With no matching decline in demand, the price would rise - in this example to P_r unless imports were available at P_s.

Such a result (of the rise in the price of imports to P_s and, more important, of the large decline in supply to S_2) would perhaps be welcomed by government because it would mean a decline in the rate at which the country's reserves were being depleted, since domestic production would drop from q_0 to q_5.

Government could also set a quota on imports, if for example it were concerned about its balance of payments; or instead it could levy a tariff on imports. In Figure 4 we begin with unlimited imports coming in to the country at the price P_m. Initially, demand and supply from domestic producers are represented by D_1 and S_1. If the government now estab-

Figure 4.

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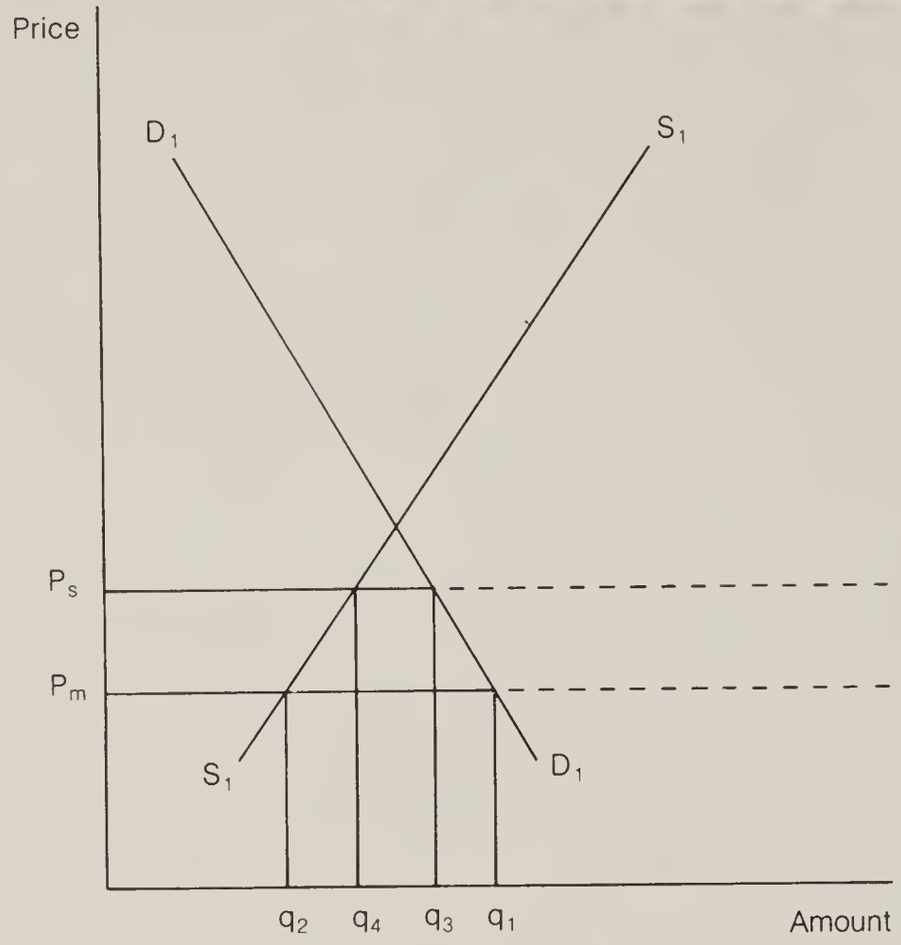

lishes a quota on imports equal to only $(q_3 - q_4)$, the price at home would rise to P_s. At that price purchases would amount to q_3, domestic output to q_4, and imports would have been cut to $(q_3 - q_4)$, as required.

With the price in the country at P_s, and the price charged by importers only P_m, anyone would be able to make a profit by purchasing imports at the lower price and selling them at the higher. Presumably the government would adopt measures to enable it to secure these gains for itself, as for example by levying a tariff equal to the difference between P_s and P_m or by charging each importer for a licence to import his share of the import quota.

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